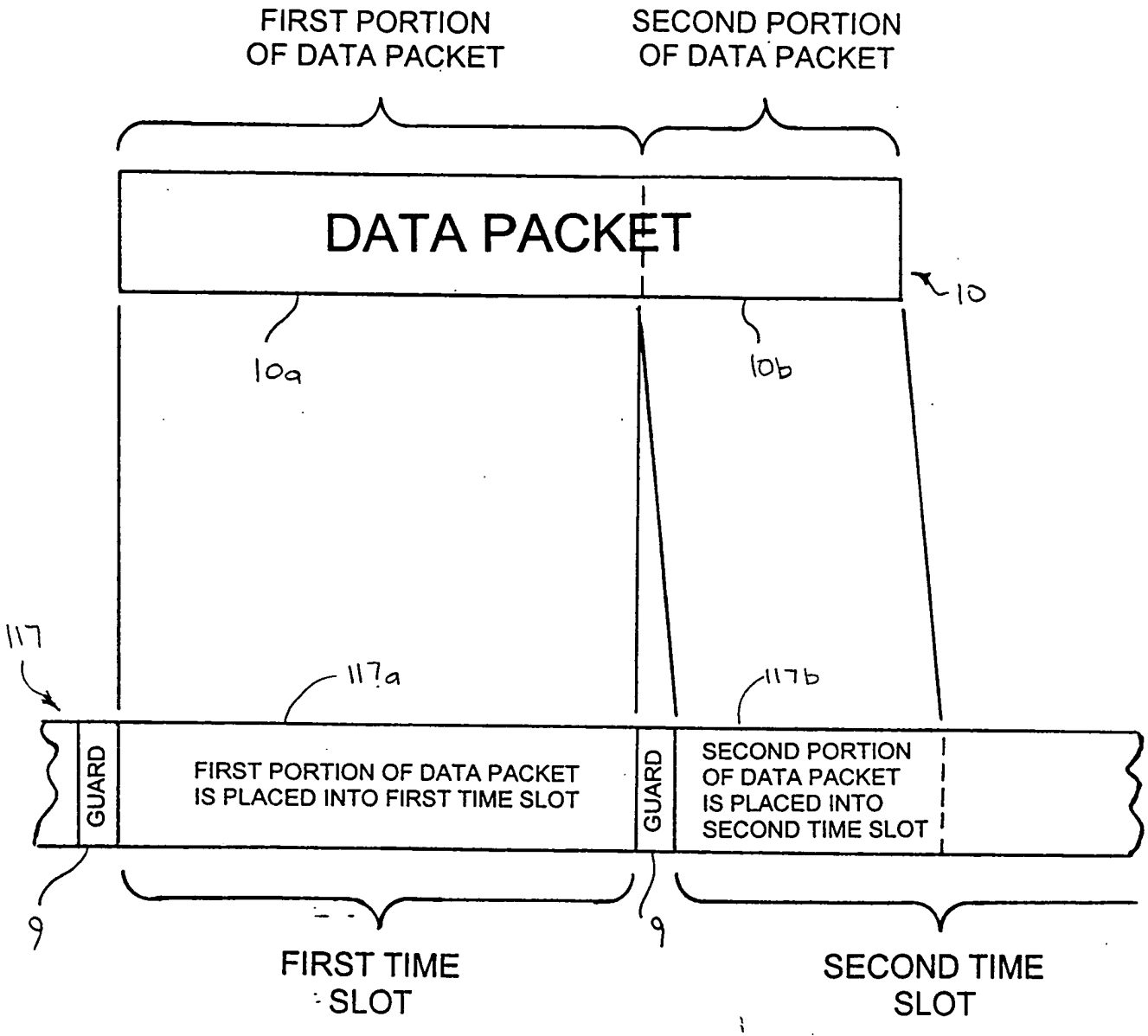


FIG. 1

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

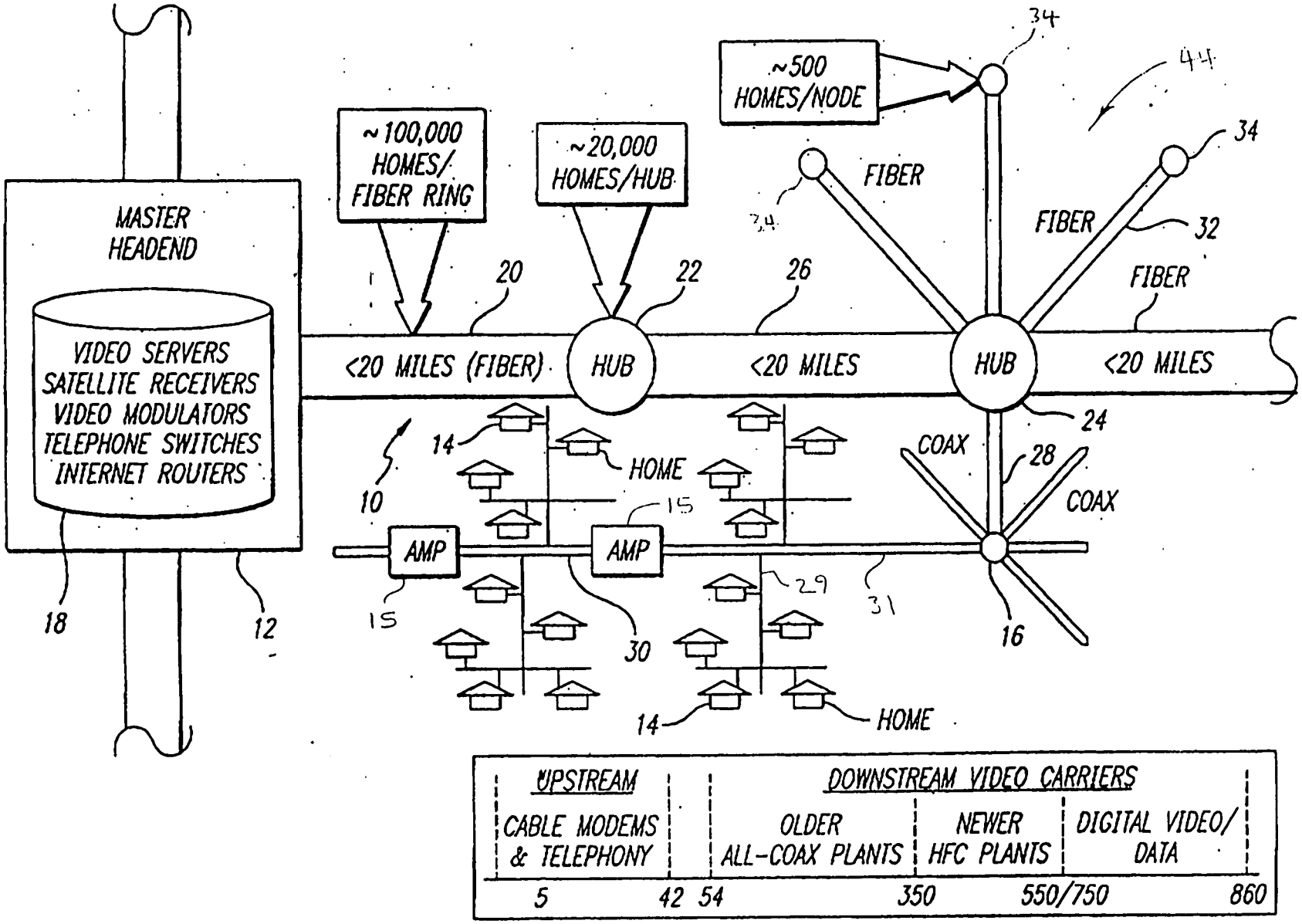


FIG. 2

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

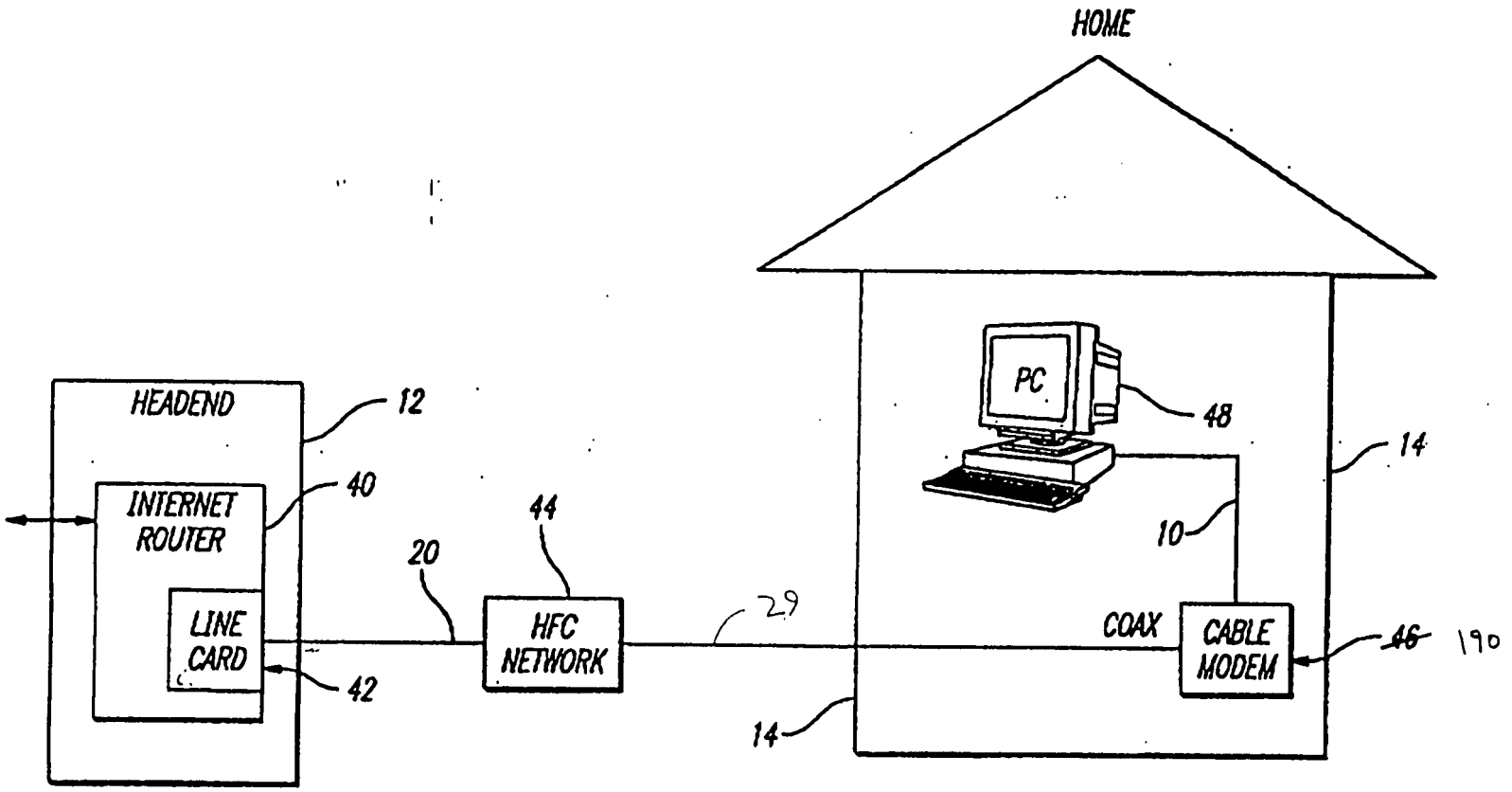


FIG. 3

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

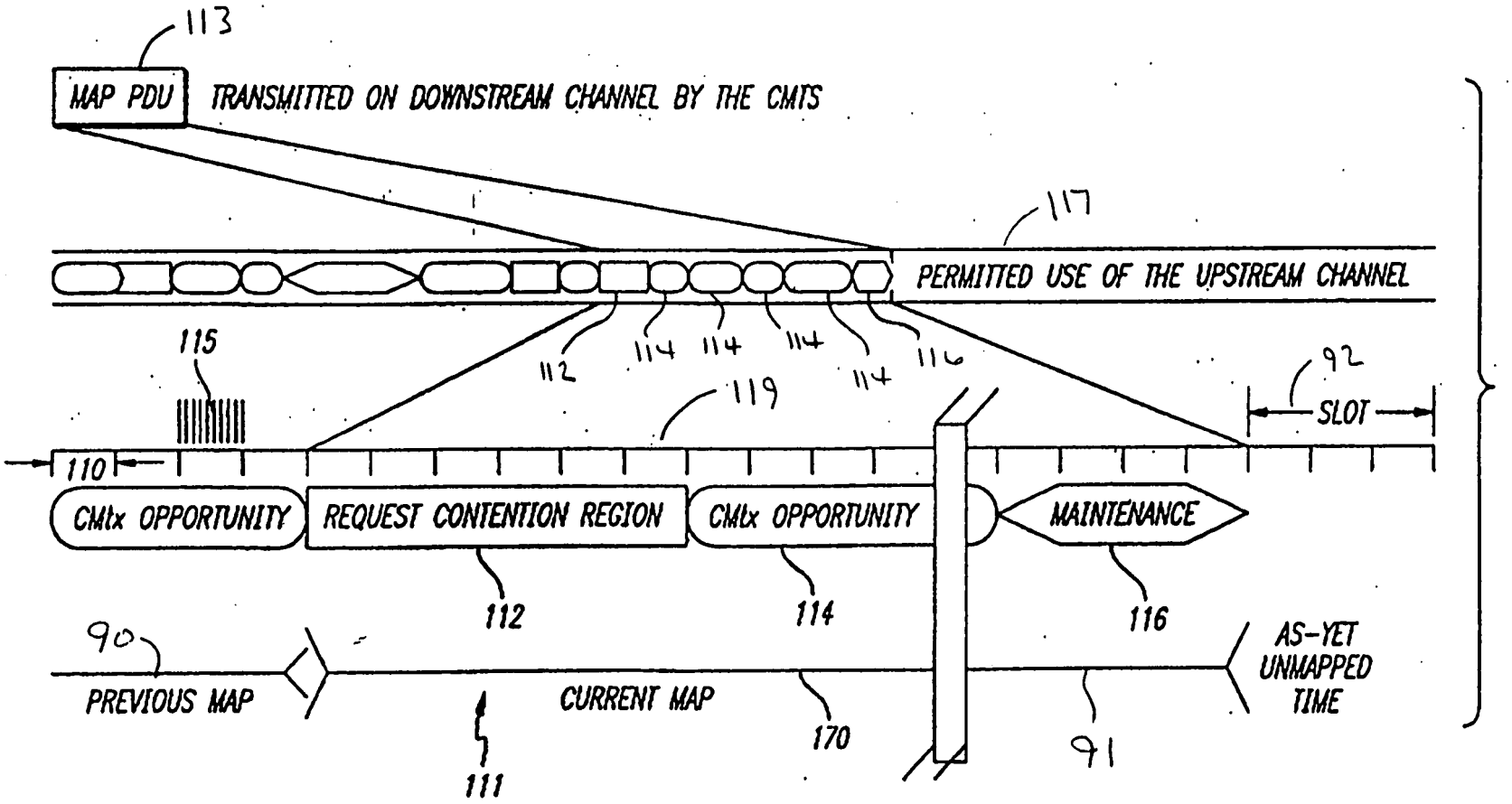

113
MAP PDU
TRANSMITTED ON DOWNSTREAM CHANNEL BY THE CMTS
117
PERMITTED USE OF THE UPSTREAM CHANNEL
115
112
114
114
114
114
116
92
SLOT
119
110
CMtx OPPORTUNITY
REQUEST CONTENTION REGION
CMtx OPPORTUNITY
MAINTENANCE
112
114
116
90
PREVIOUS MAP
CURRENT MAP
AS-YET UNMAPPED TIME
111
170
91

FIG. 4

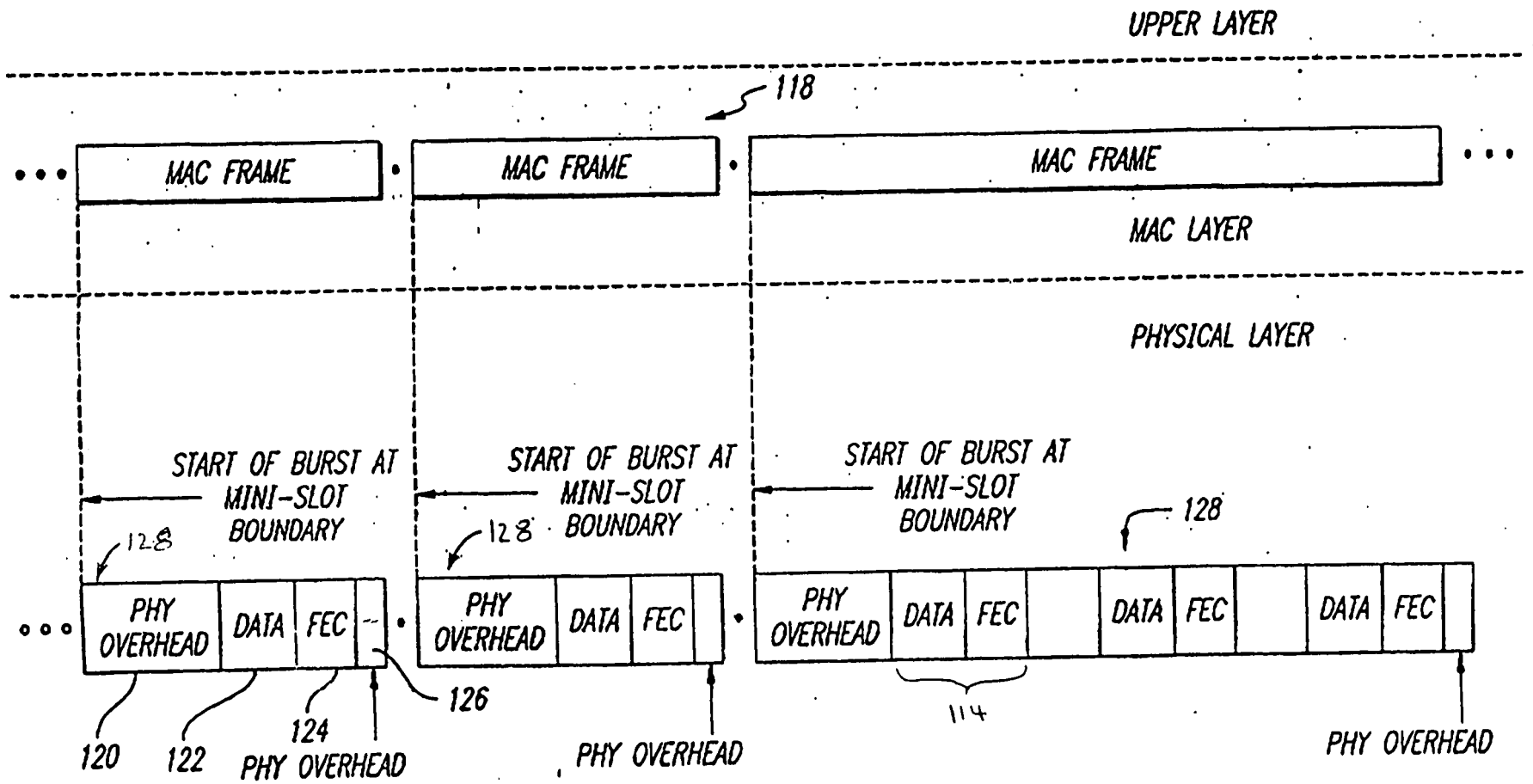


FIG. 5

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

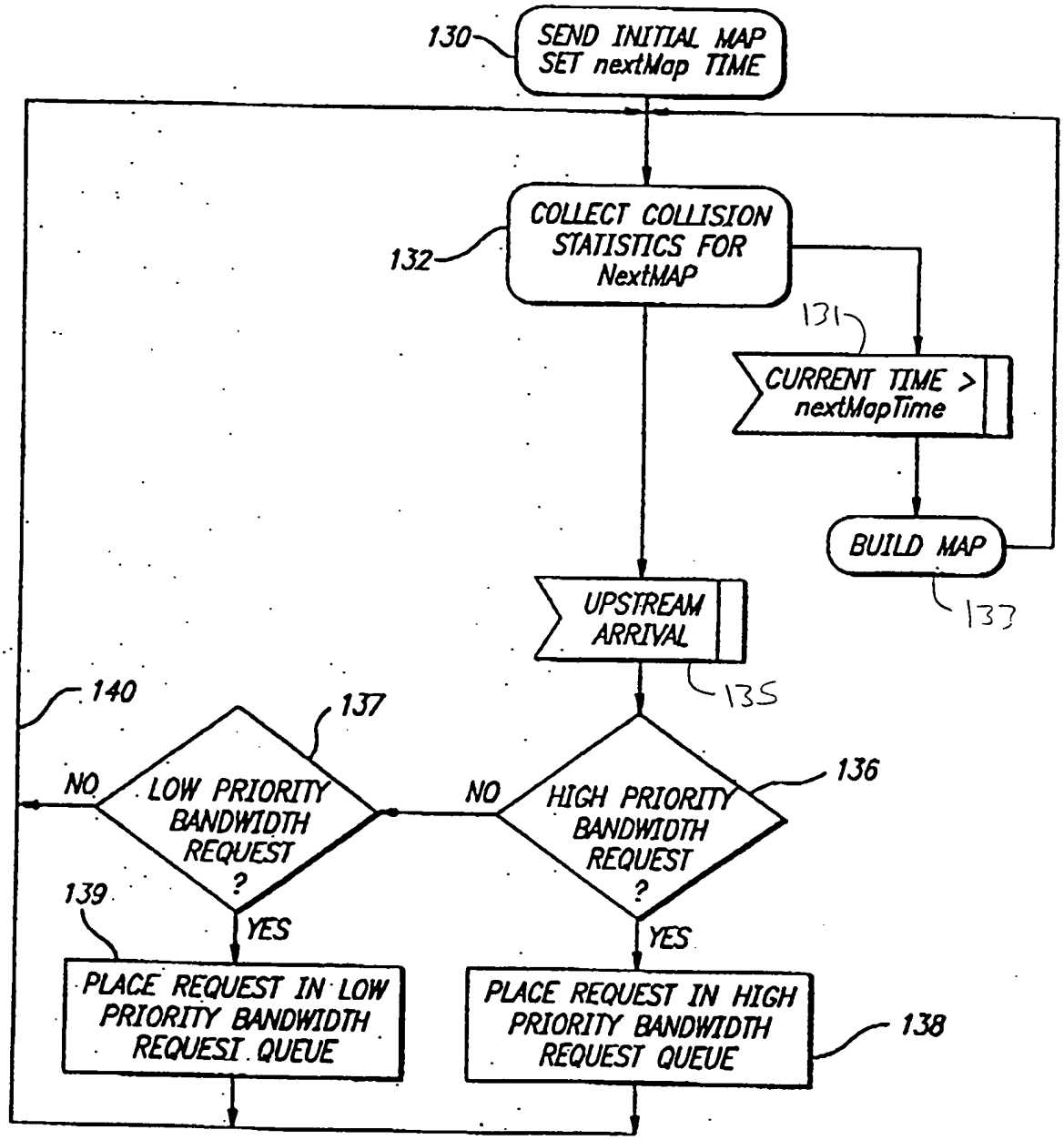


FIG. 6

DATA PACKET
FRAGMENTATION IN A
CABLE MODEM SYSTEM

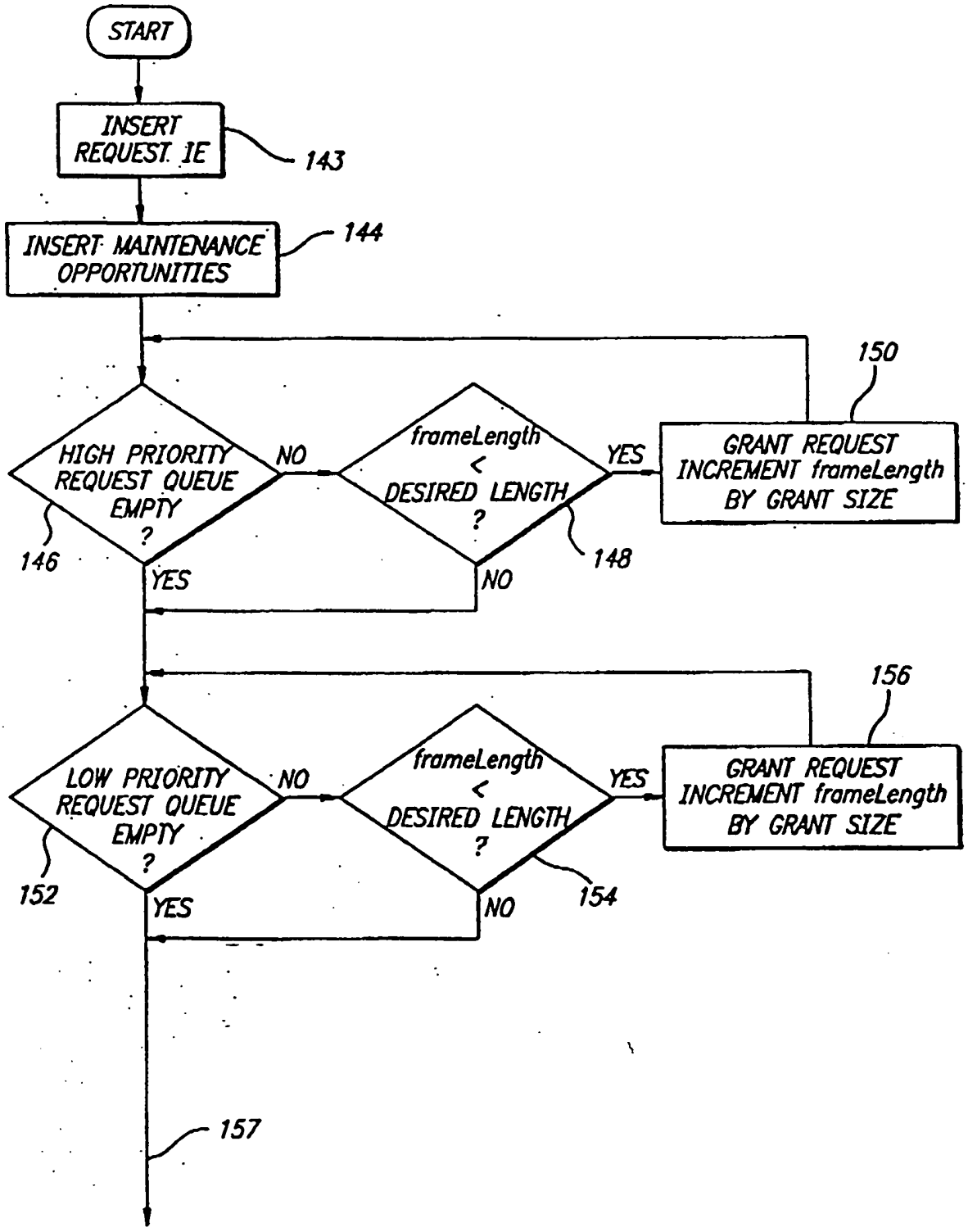


FIG. 7

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

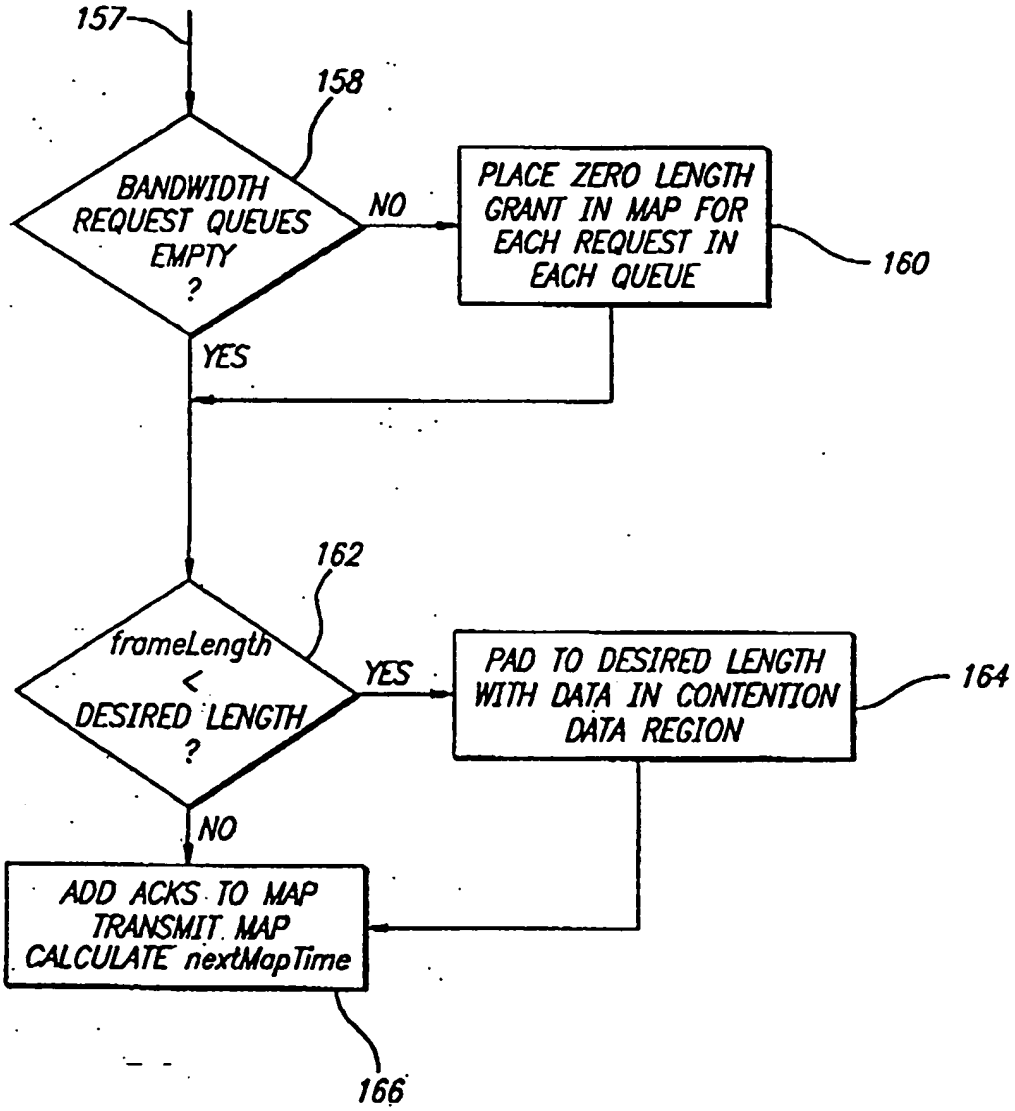


FIG. 8

DATA PACKET
FRAGMENTATION IN A
CABLE MODEM SYSTEM

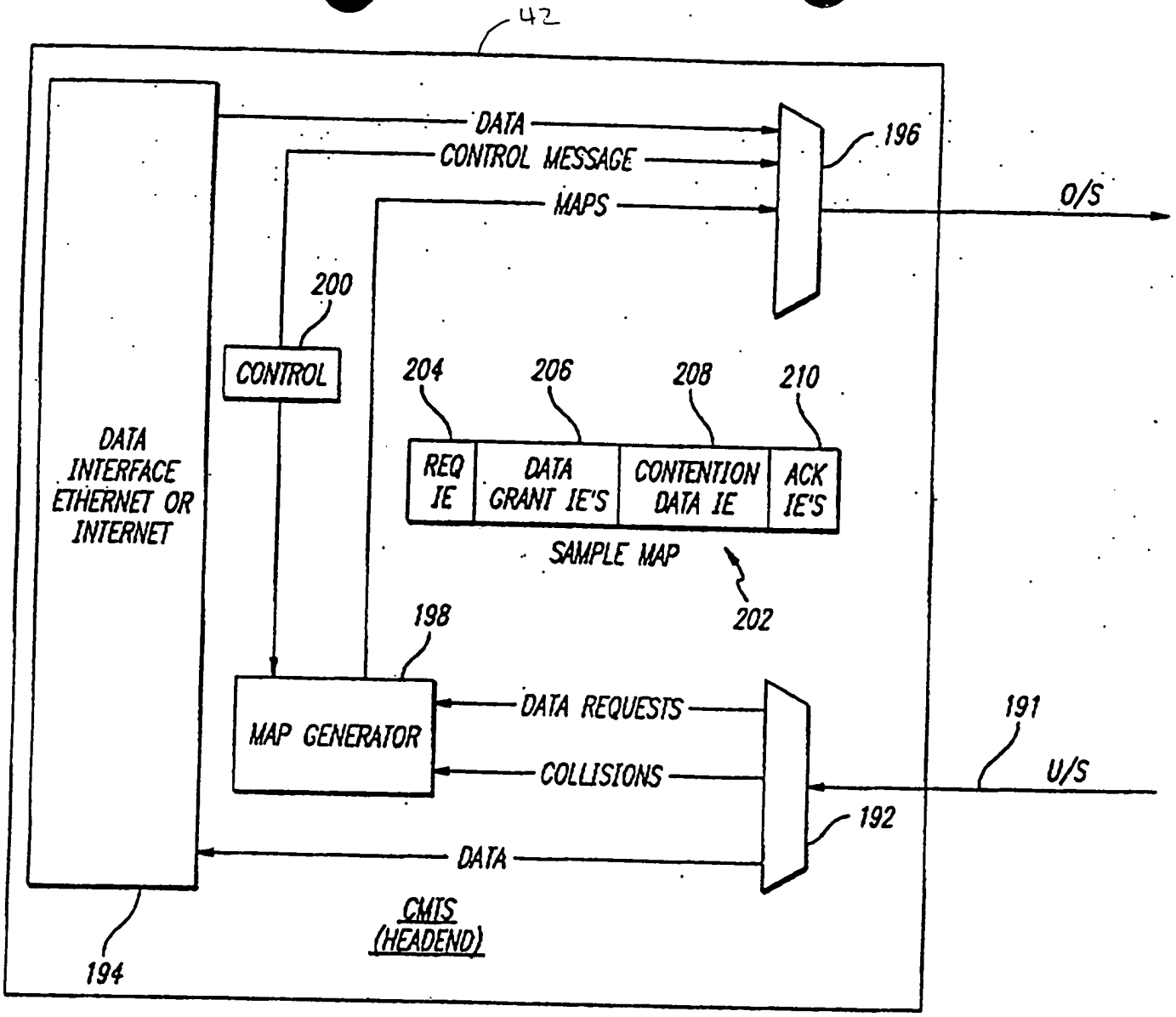


FIG. 9

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

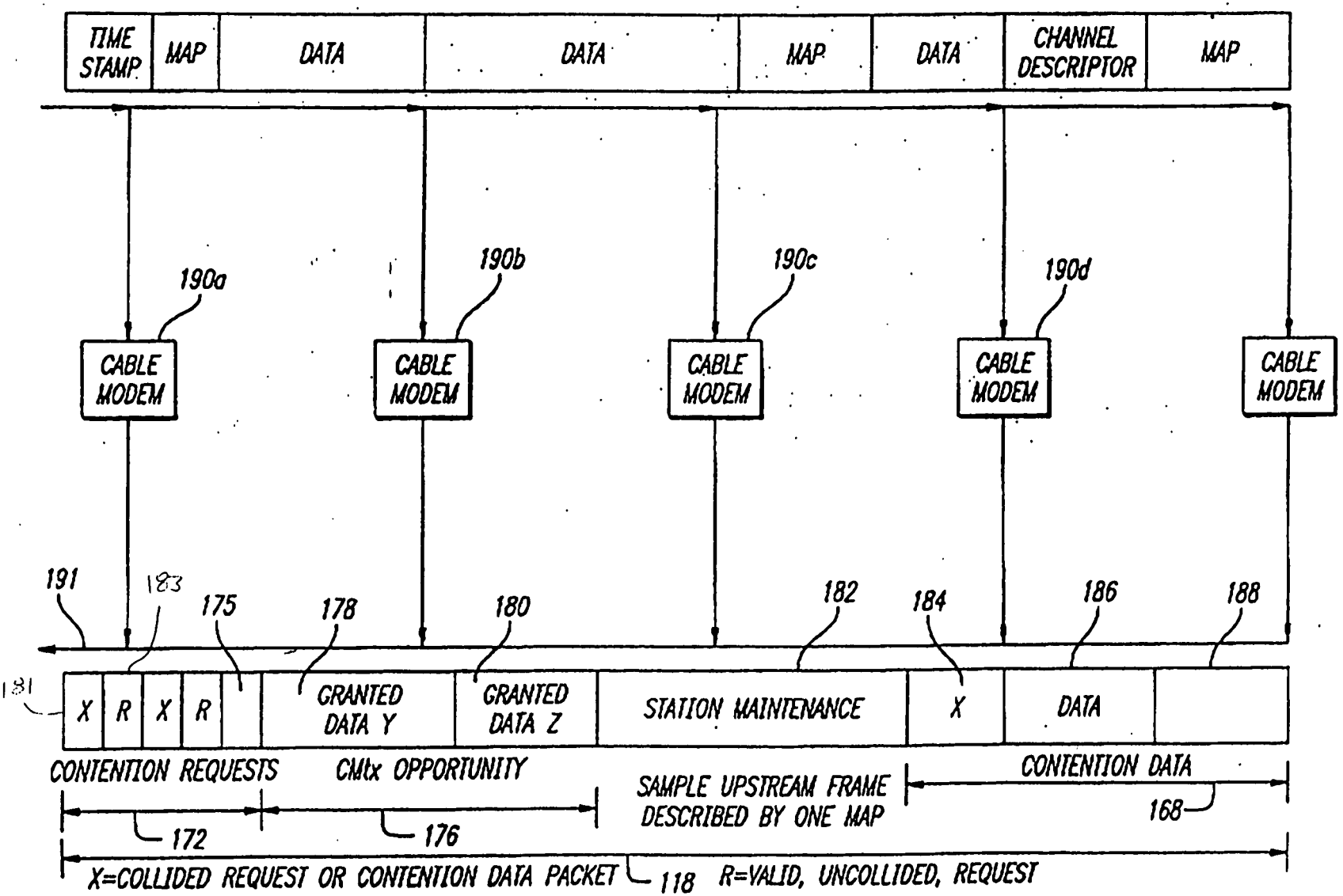

TIME STAMP
MAP
DATA
DATA
MAP
DATA
CHANNEL DESCRIPTOR
MAP
190a
190b
190c
190d
CABLE MODEM
CABLE MODEM
CABLE MODEM
CABLE MODEM
CABLE MODEM
191
183
175
178
180
182
184
186
188
131
X
R
X
R
GRANTED DATA Y
GRANTED DATA Z
STATION MAINTENANCE
X
DATA
CONTENTION REQUESTS
CMtx OPPORTUNITY
SAMPLE UPSTREAM FRAME DESCRIBED BY ONE MAP
CONTENTION DATA
172
176
168
X=COLLIDED REQUEST OR CONTENTION DATA PACKET
118
R=VALID, UNCOLLIDED, REQUEST

FIG. 10

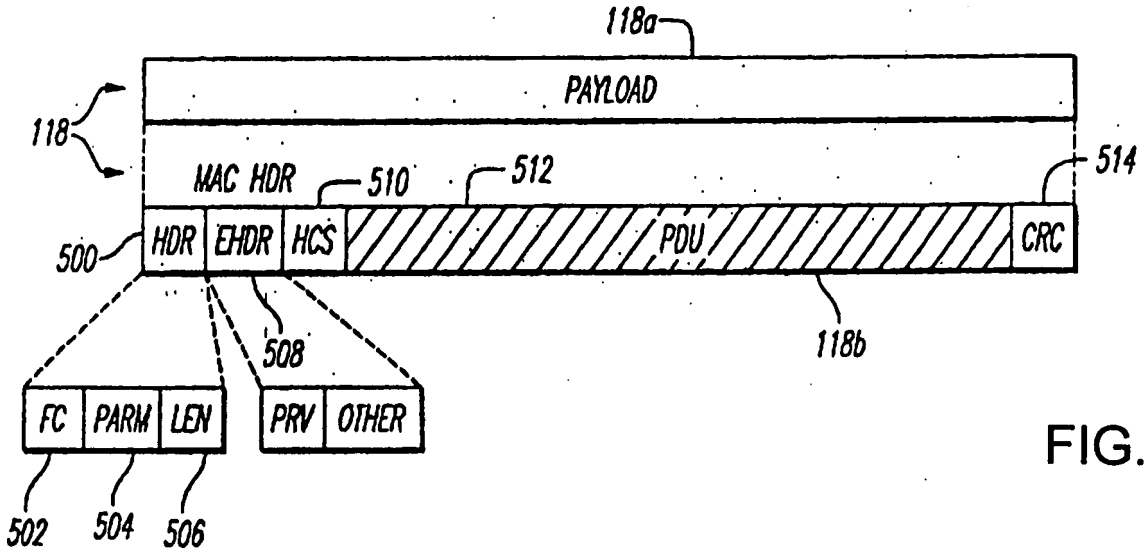


FIG. 11

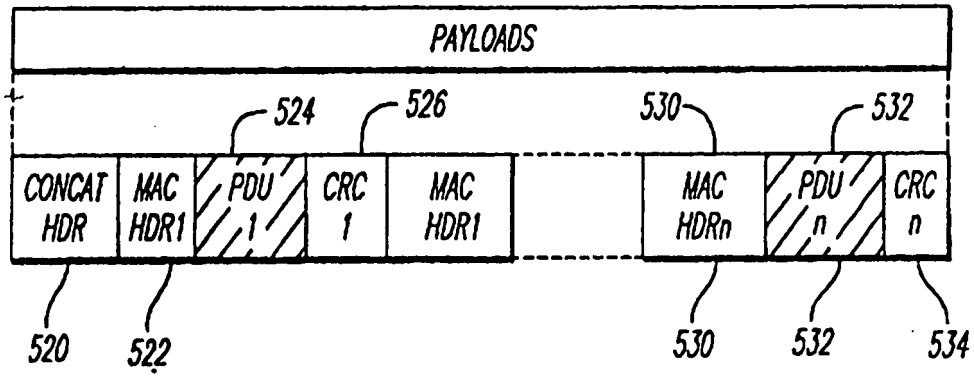


FIG. 12

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

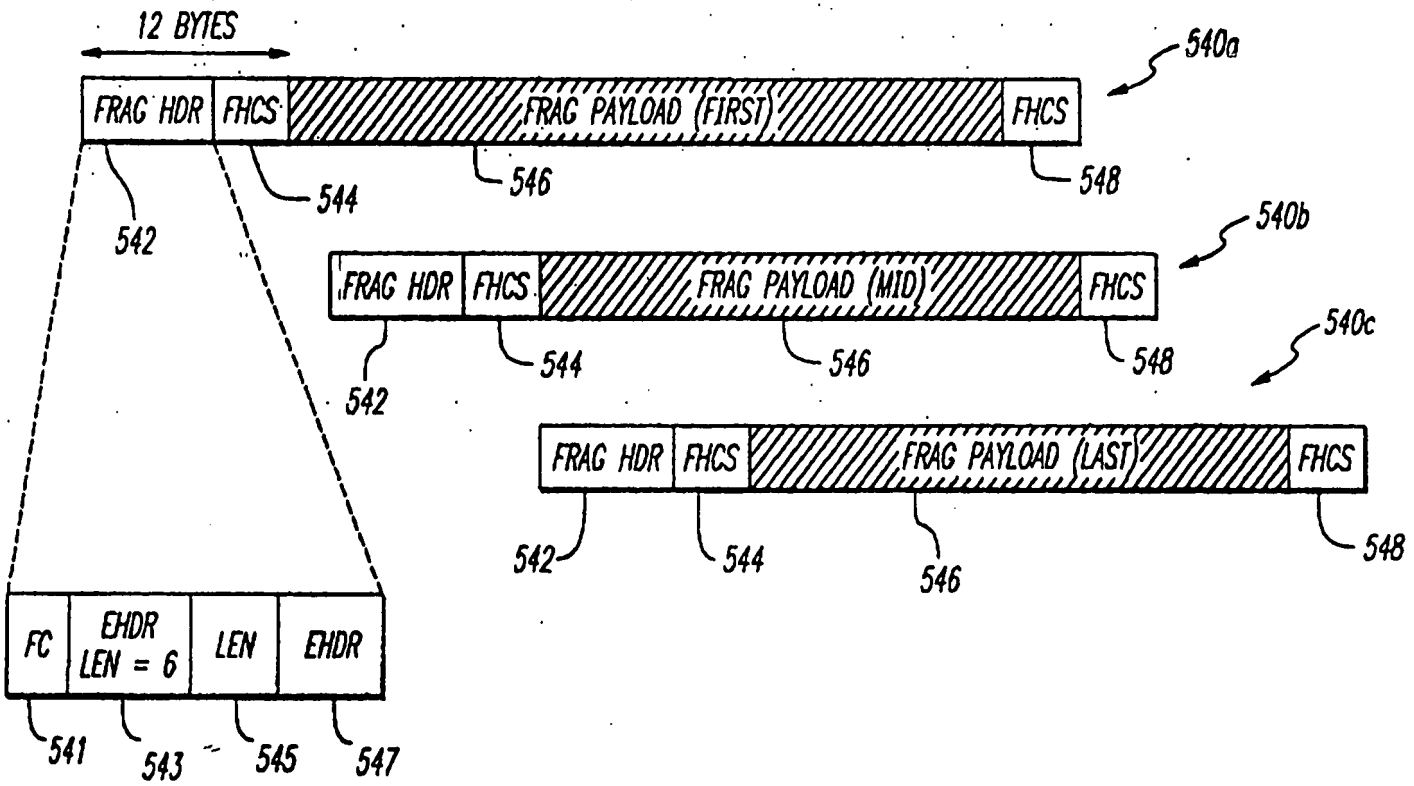


FIG. 13

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

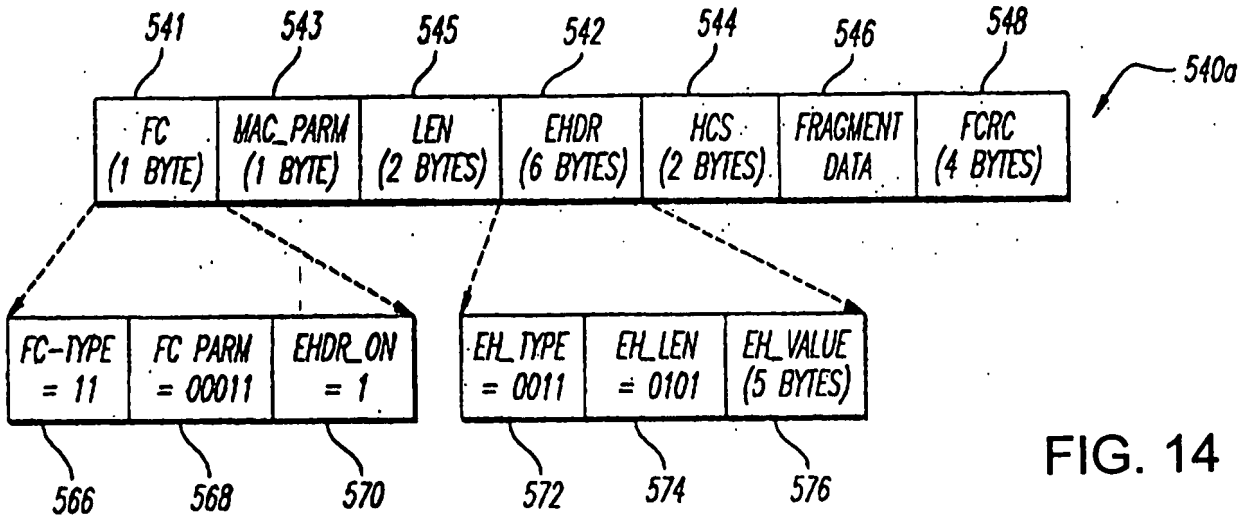


FIG. 14

FIELD	USAGE	SIZE
FC	FC_TYPE = 11;MAC-SPECIFIC HEADER FC_PARM [4:0] = 00011;FRAGMENTATION MAC HEADER EHDR_ON = 1;FRAGMENTATION EHDR FOLLOWS	8 BITS
MAC_PARM	ELEN = 6 BYTES;LENGTH OF FRAGMENTATION EHDR	8 BITS
LEN	LEN = n + 10;TOTAL LENGTH OF THIS FRAGMENT INCLUDING PAYLOAD, EHDR, FCRC	16 BITS

FIG. 15

FIELD	USAGE	SIZE	
EHDR	EH_TYPE=3;SAME TYPE AS BP_UP	4 BITS	6 BYTES
	EH_LEN=5;LENGTH OF THIS EHDR	4 BITS	
	KEY_SEQ;SAME AS IN BP_UP	4 BITS	
	VER=0001;VERSION NUMBER FOR THIS EHDR	4 BITS	
	ENABLE	1 BIT	
	IF ENABLE=0, BPI DISABLED		
	IF ENABLE=1, BPI ENABLED		
	TOGGLE BIT;SAME AS IN BP_UP	1 BIT	
	SID;SERVICE ID ASSOCIATED WITH THIS FRAGMENT	14 BITS	
	REQ;NUMBER OF MINI-SLOTS FOR A PIGGYBACK REQUEST	8 BITS	
	RESERVED;MUST BE SET TO ZERO	2 BITS	
	FIRST_FRAG;SET TO ONE FOR FIRST FRAGMENT ONLY	1 BIT	
	LAST_FRAG;SET TO ONE FOR LAST FRAGMENT ONLY	1 BIT	
	FRAG_SEQ;FRAGMENT SEQUENCE COUNT, INCREMENTED FOR EACH FRAGMENT, SET TO ZERO FOR FIRST FRAGMENT	4 BITS	
HCS	MAC HEADER CHECK SEQUENCE		2 BYTES
FRAGMENT DATA	FRAGMENT PAYLOAD;PORTION OF TOTAL MAC PDU BEING SENT		n BYTES
FCRC	CRC ACROSS FRAGMENT PAYLOAD		4 BYTES
	LENGTH OF A MAC FRAGMENT FRAME	n + 16 BYTES	

FIG. 16

DATA PACKET
FRAGMENTATION IN A
CABLE MODEM SYSTEM

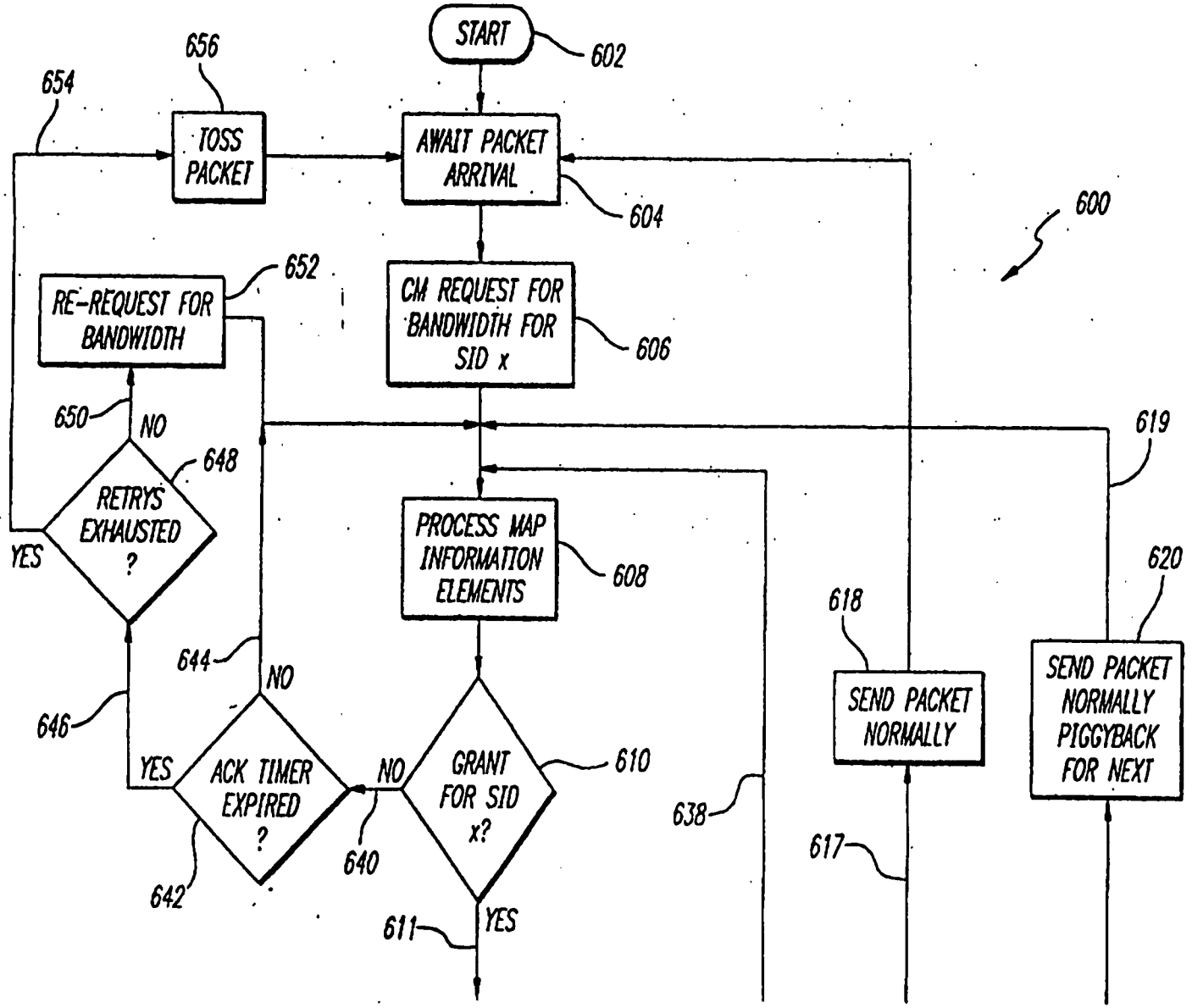

START
602
656
654
TOSS PACKET
AWAIT PACKET ARRIVAL
604
600
652
RE-REQUEST FOR BANDWIDTH
CM REQUEST FOR BANDWIDTH FOR SID x
606
650
NO
619
648
RETRYS EXHAUSTED ?
YES
PROCESS MAP INFORMATION ELEMENTS
608
620
618
644
NO
646
SEND PACKET NORMALLY
SEND PACKET NORMALLY PIGGYBACK FOR NEXT
YES
ACK TIMER EXPIRED ?
NO
GRANT FOR SID x?
610
638
640
617
642
611
YES

FIG. 17

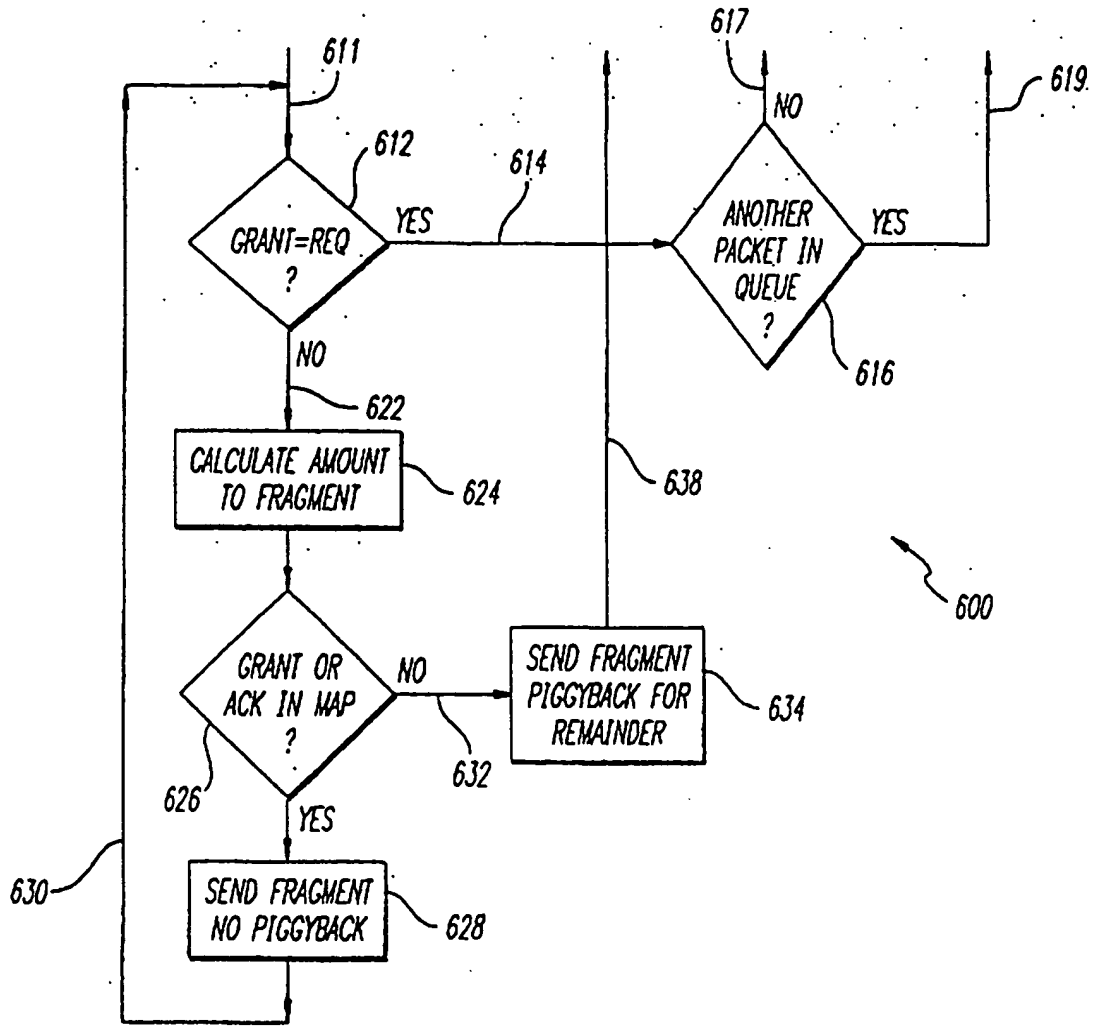


FIG. 18

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

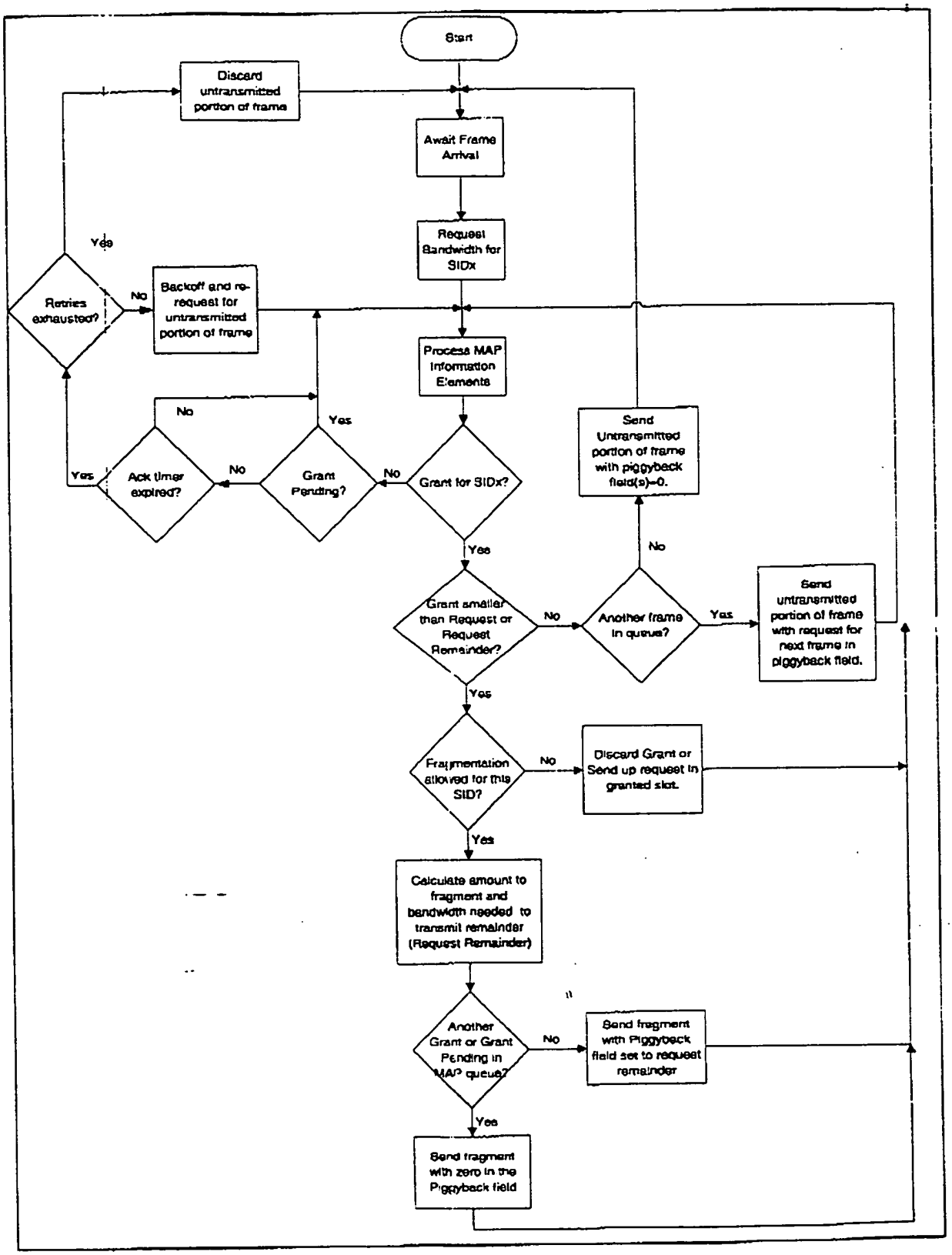


FIG. 19

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

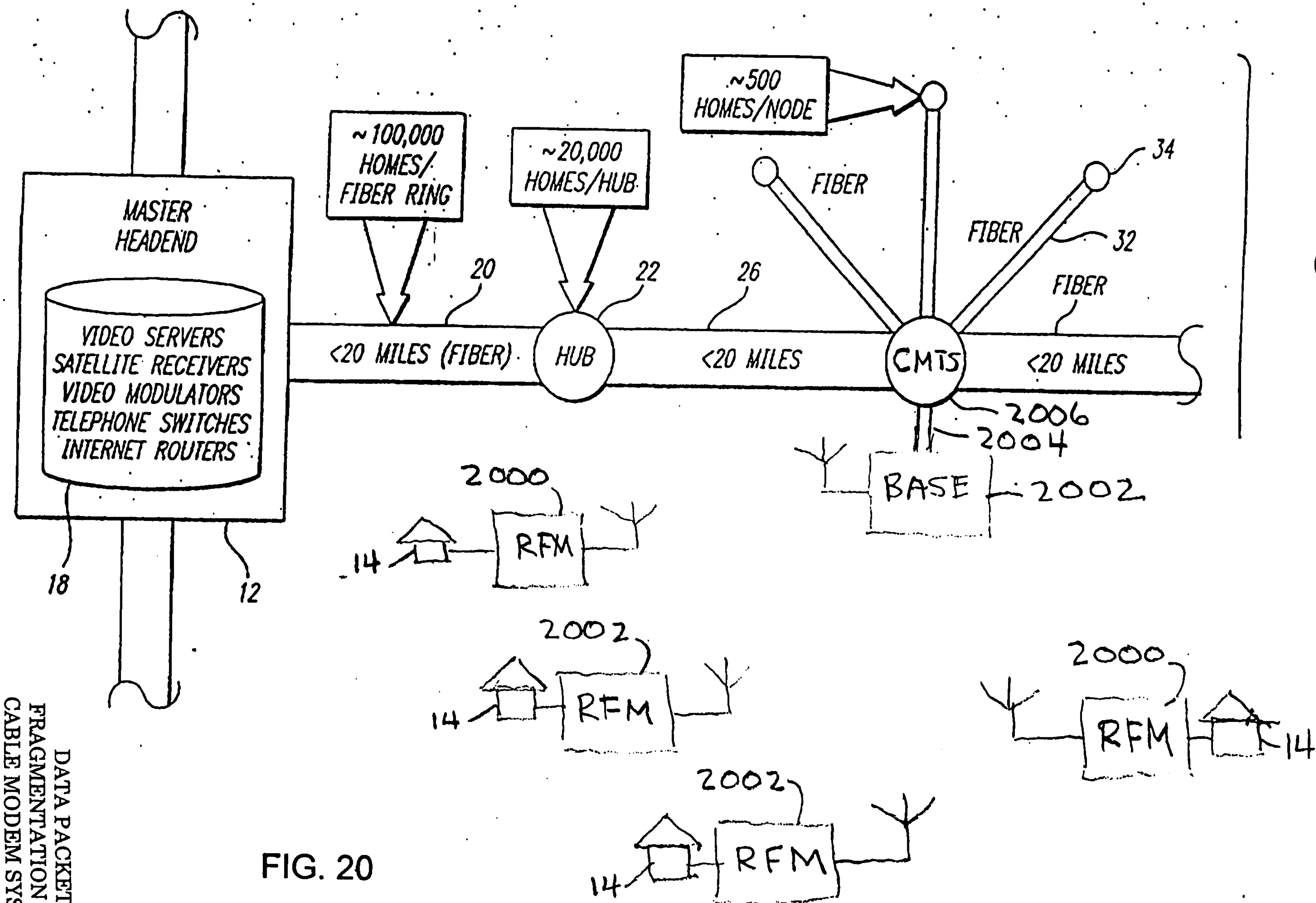


FIG. 20

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

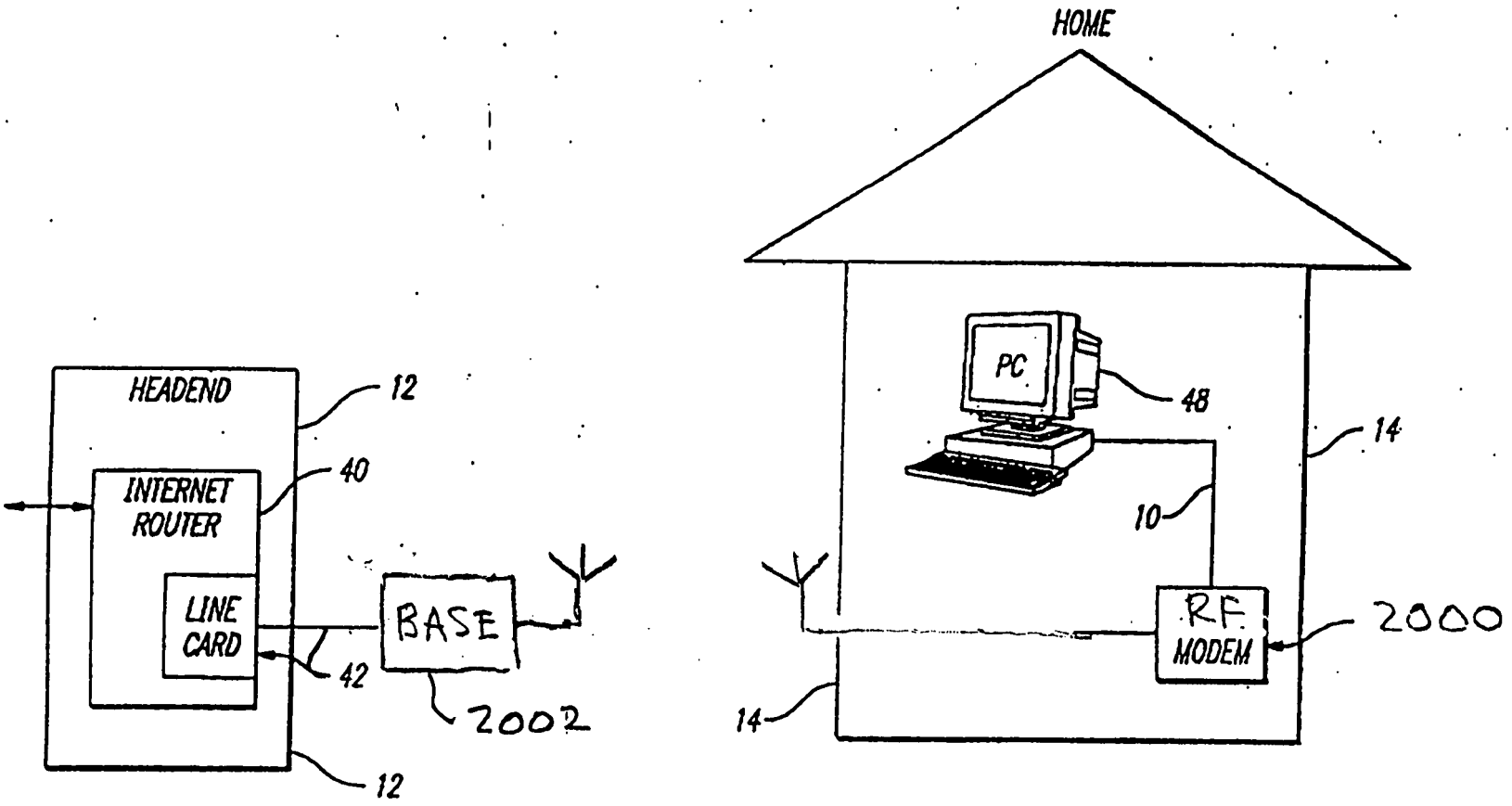


FIG. 21

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

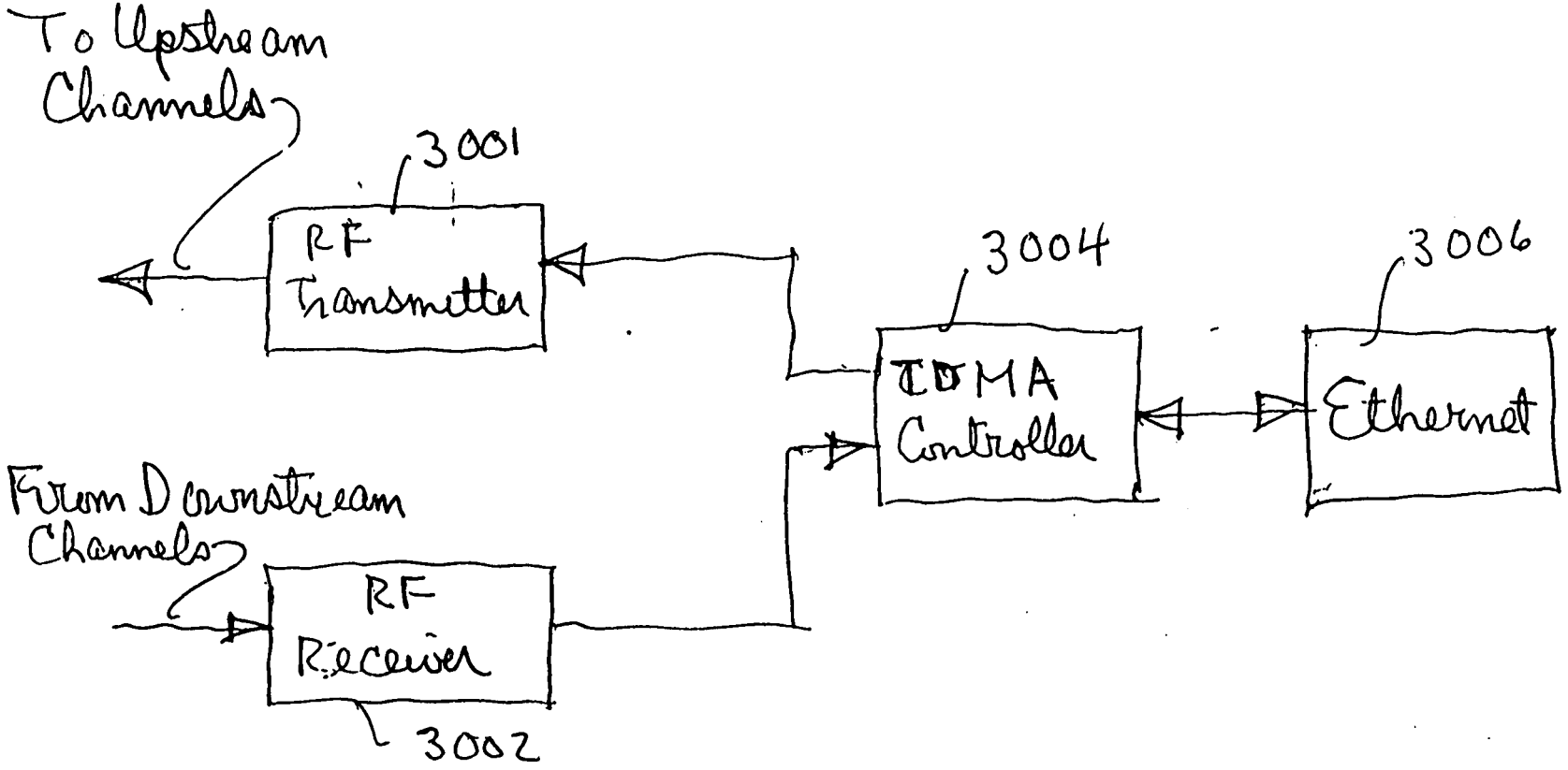


FIG. 22

DATA PACKET FRAGMENTATION IN A CABLE MODEM SYSTEM

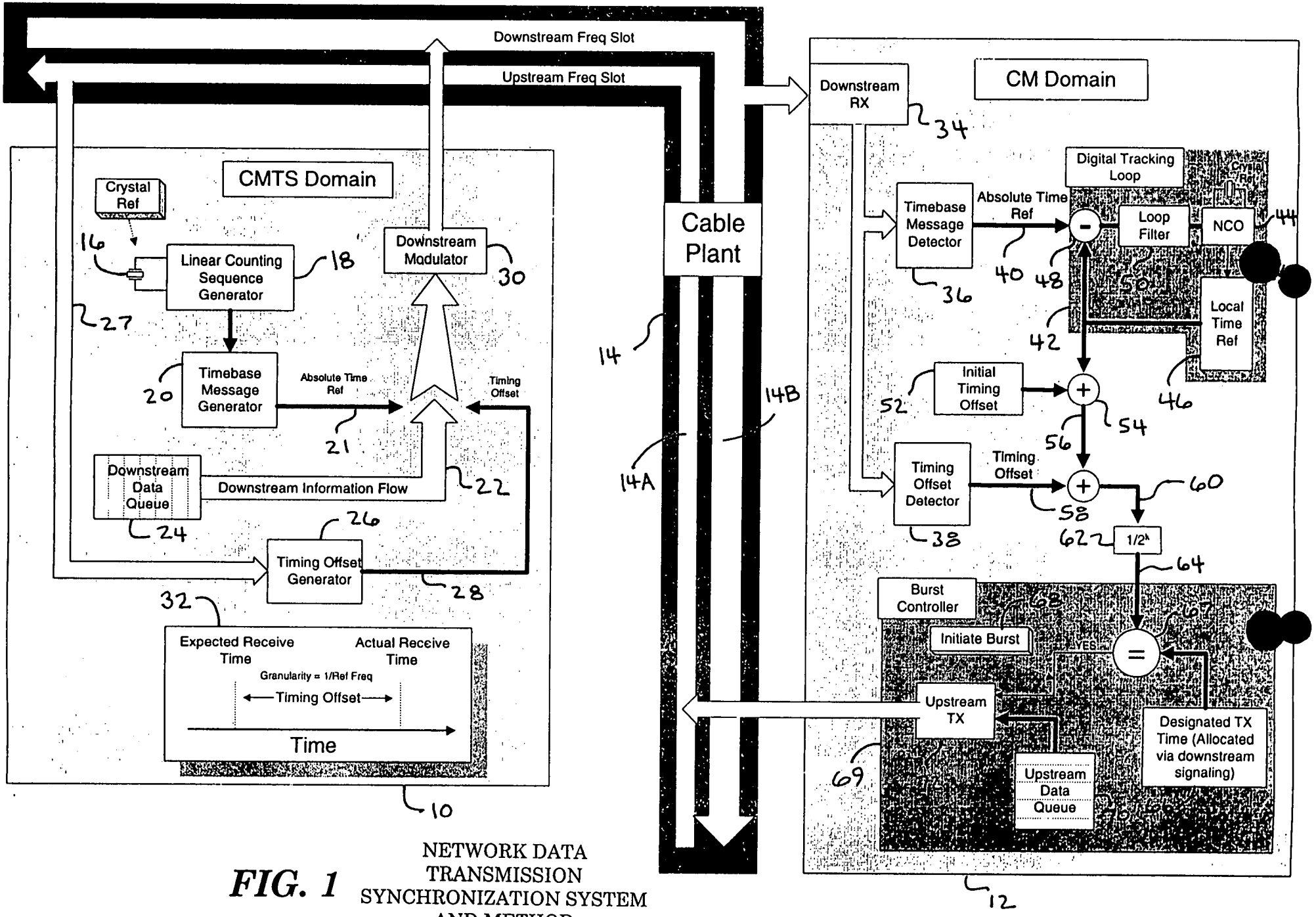


FIG. 1 NETWORK DATA TRANSMISSION SYNCHRONIZATION SYSTEM AND METHOD

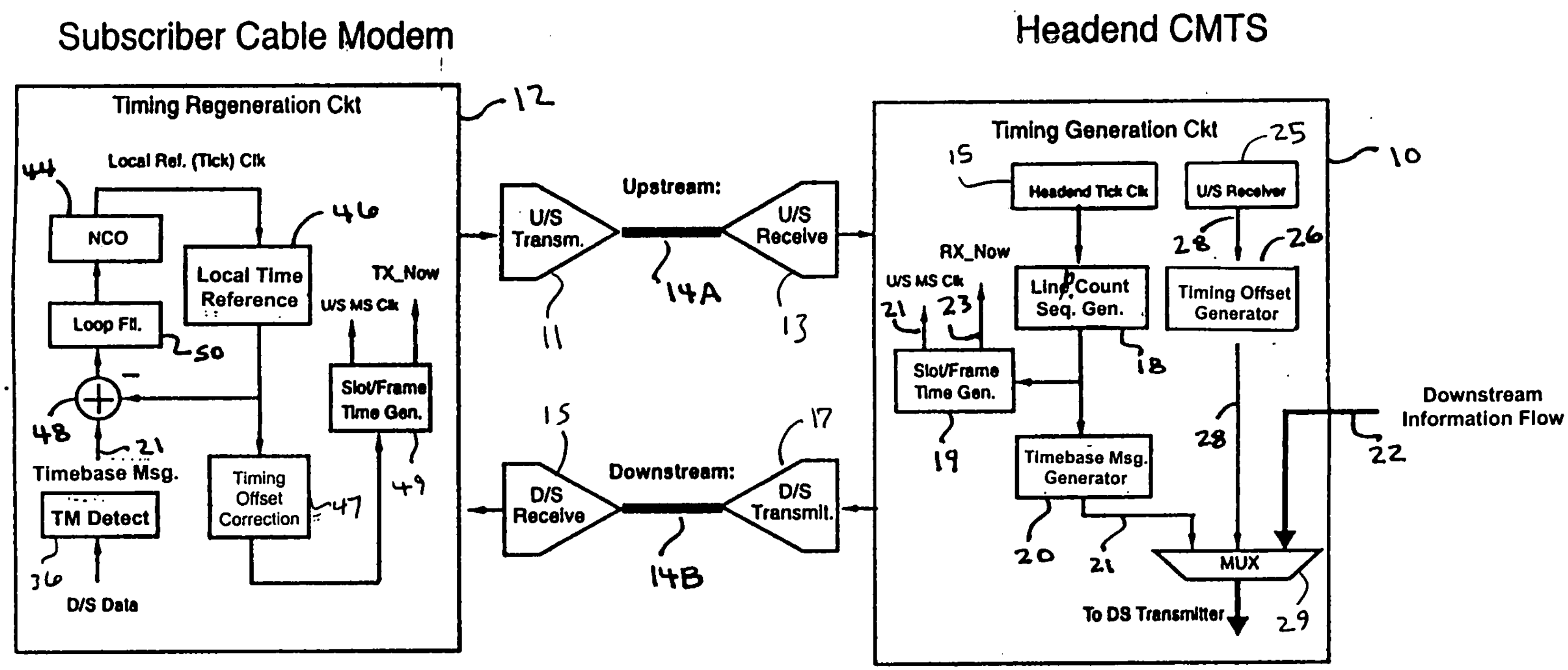


FIG. 2

NETWORK DATA TRANSMISSION SYNCHRONIZATION SYSTEM AND METHOD

NETWORK DATA TRANSMISSION SYNCHRONIZATION SYSTEM AND METHOD

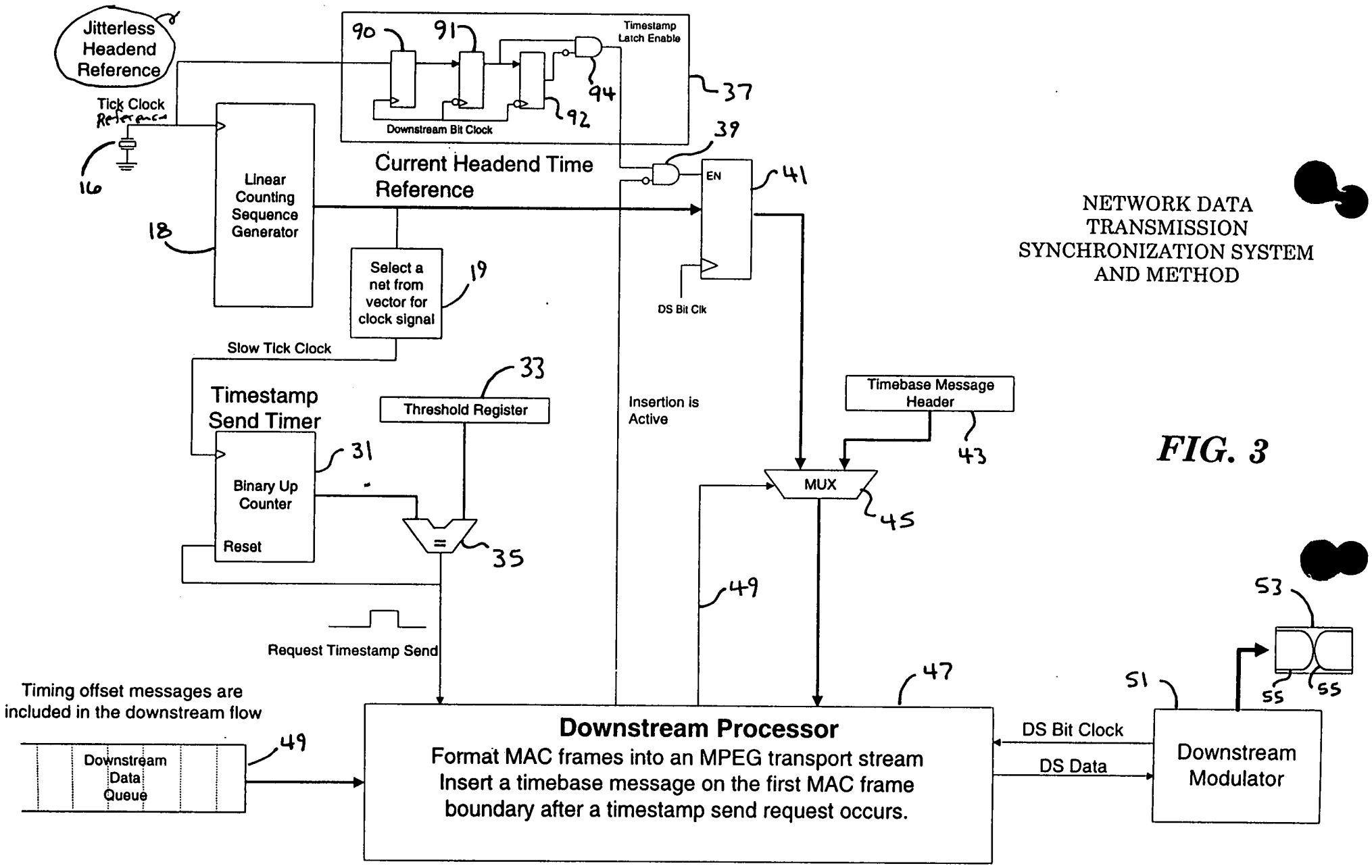


FIG. 3

NETWORK DATA TRANSMISSION SYNCHRONIZATION SYSTEM AND METHOD

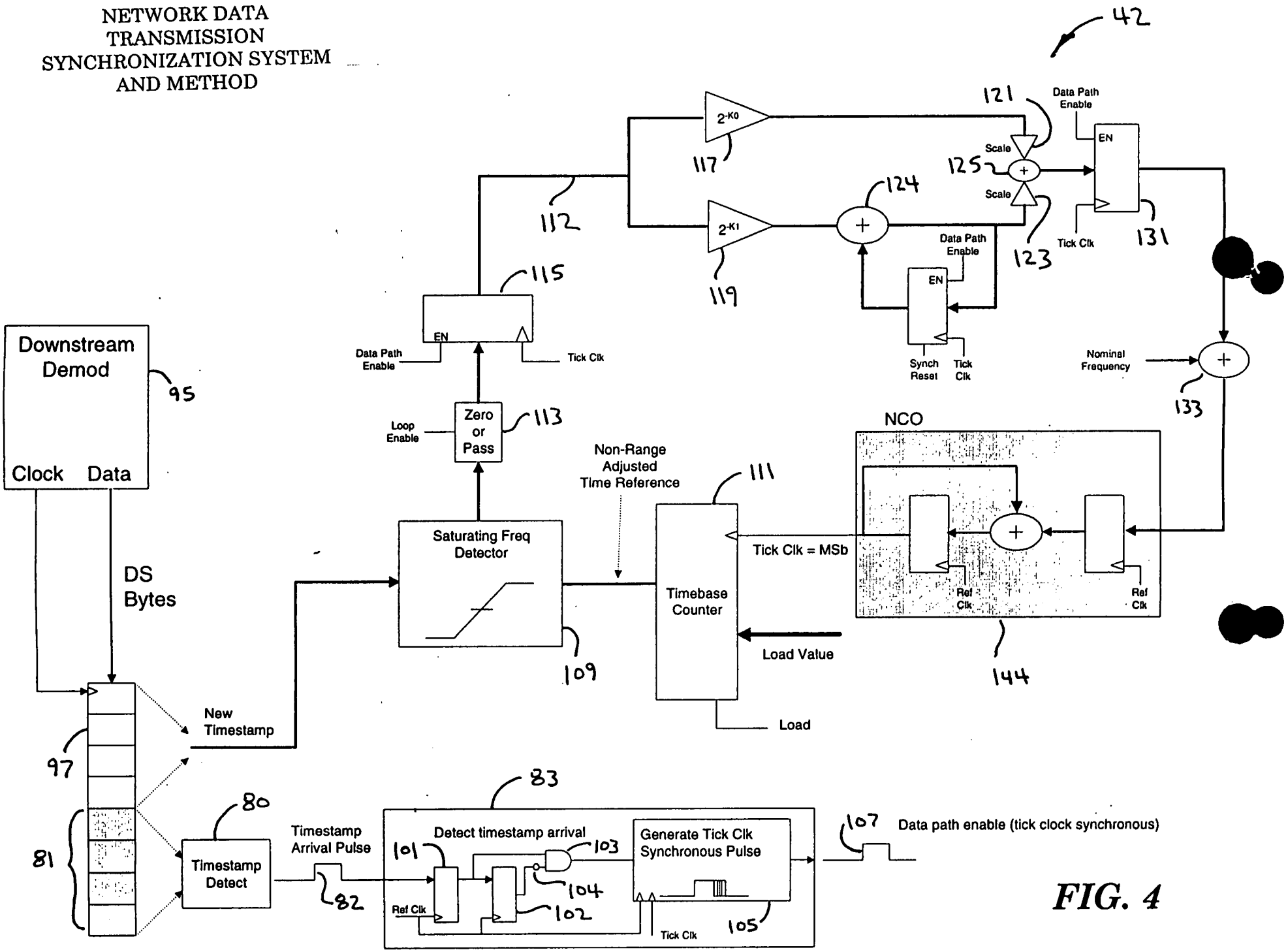
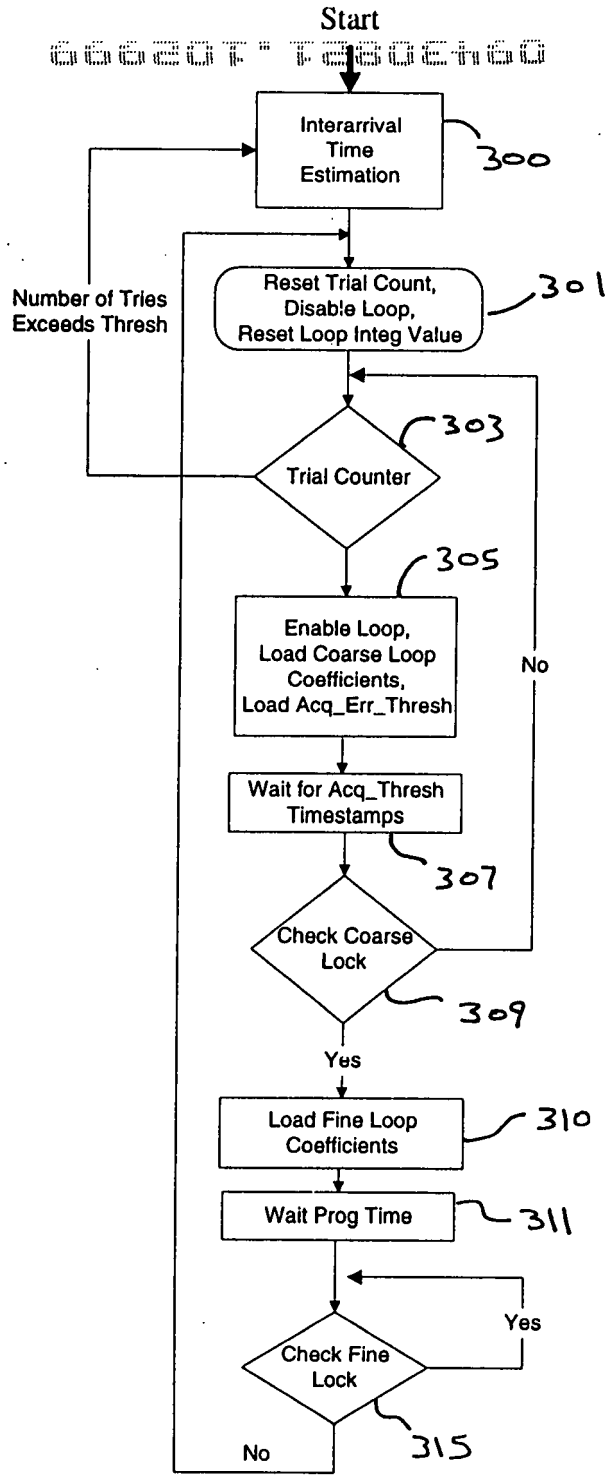


FIG. 4

Update Rate	Coarse Coeffs	Fine Coefficients
1kHz (1ms)	$K0 = 2^{-11}$ $K1 = 2^{-15}$ (BW=50Hz)	$K0 = 2^{-16}$ $K1 = 2^{-25}$ (BW=1Hz)
300Hz (3.3ms)	$K0 = 2^{-12}$ $K1 = 2^{-15}$ (BW=20Hz)	$K0 = 2^{-16}$ $K1 = 2^{-23}$ (BW=1Hz)
100Hz (10ms)	$K0 = 2^{-13}$ $K1 = 2^{-16}$ (BW=10Hz)	$K0 = 2^{-16}$ $K1 = 2^{-22}$ (BW=1Hz)
50Hz (20ms)	$K0 = 2^{-14}$ $K1 = 2^{-17}$ (BW=5Hz)	$K0 = 2^{-16}$ $K1 = 2^{-21}$ (BW=1Hz)
30Hz (33ms)	$K0 = 2^{-15}$ $K1 = 2^{-18}$ (BW=3Hz)	$K0 = 2^{-17}$ $K1 = 2^{-21}$ (BW=1Hz)
10Hz (100ms)	$K0 = 2^{-17}$ $K1 = 2^{-20}$ (BW=1Hz)	$K0 = 2^{-17}$ $K1 = 2^{-20}$ (BW=1Hz)
5Hz (200ms)	$K0 = 2^{-18}$ $K1 = 2^{-20}$ (BW=1Hz)	$K0 = 2^{-18}$ $K1 = 2^{-20}$ (BW=1Hz)

FIG. 5



NETWORK DATA TRANSMISSION SYNCHRONIZATION SYSTEM AND METHOD

FIG. 6

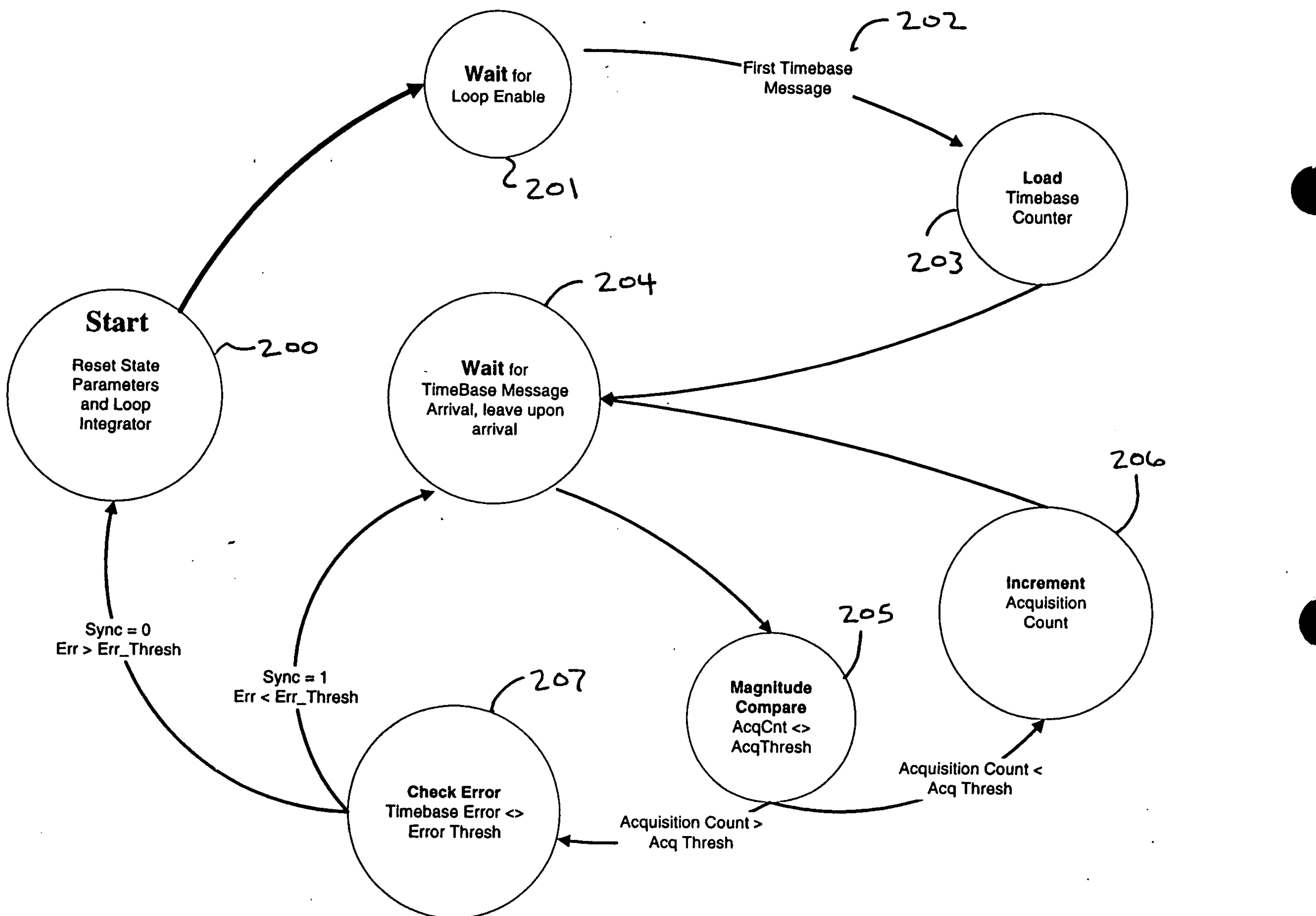

Start
Reset State Parameters and Loop Integrator
200
Wait for Loop Enable
201
First Timebase Message
202
Load Timebase Counter
203
Wait for TimeBase Message Arrival, leave upon arrival
204
Magnitude Compare AcqCnt <> AcqThresh
205
Increment Acquisition Count
206
Check Error Timebase Error <> Error Thresh
207
Acquisition Count < Acq Thresh
Acquisition Count > Acq Thresh
Sync = 1
Err < Err_Thresh
Sync = 0
Err > Err_Thresh

FIG. 7

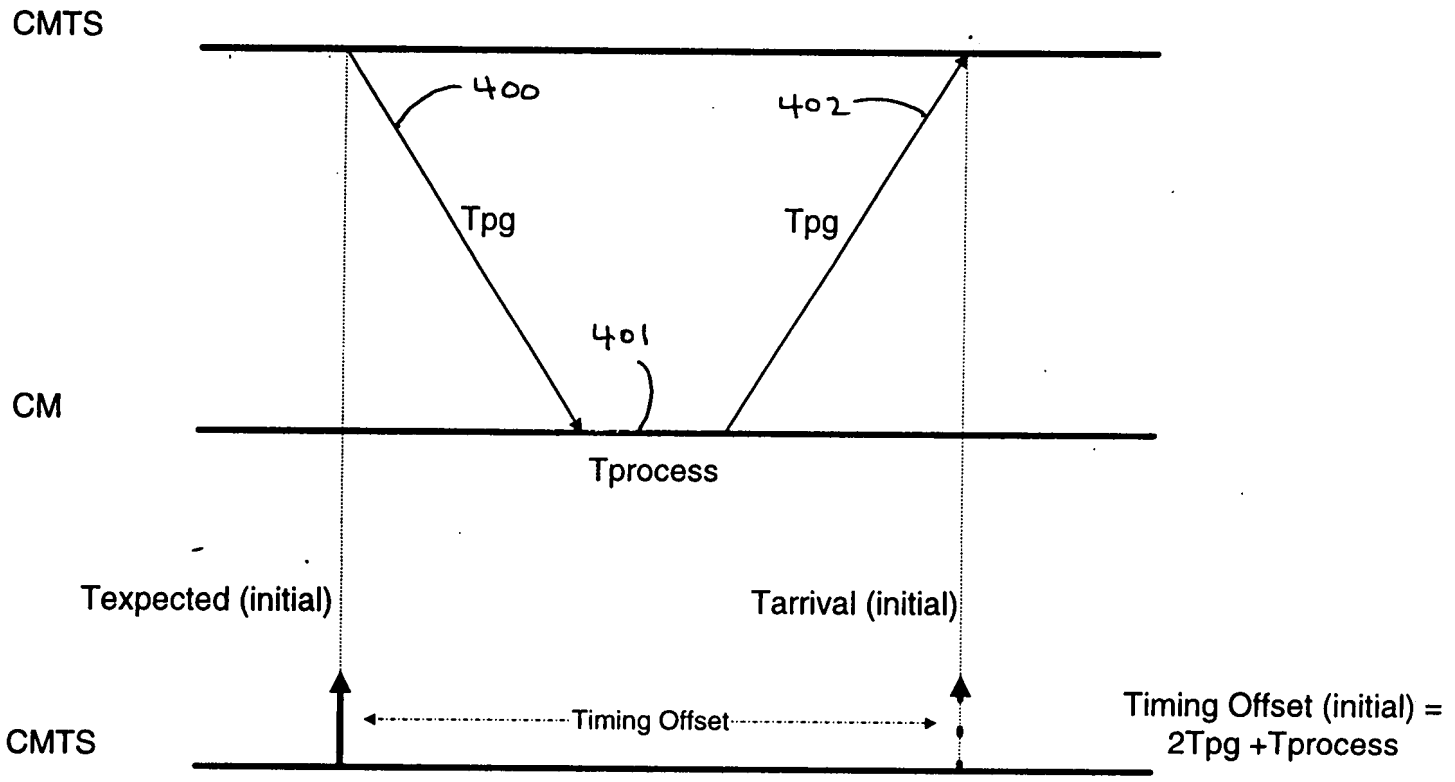
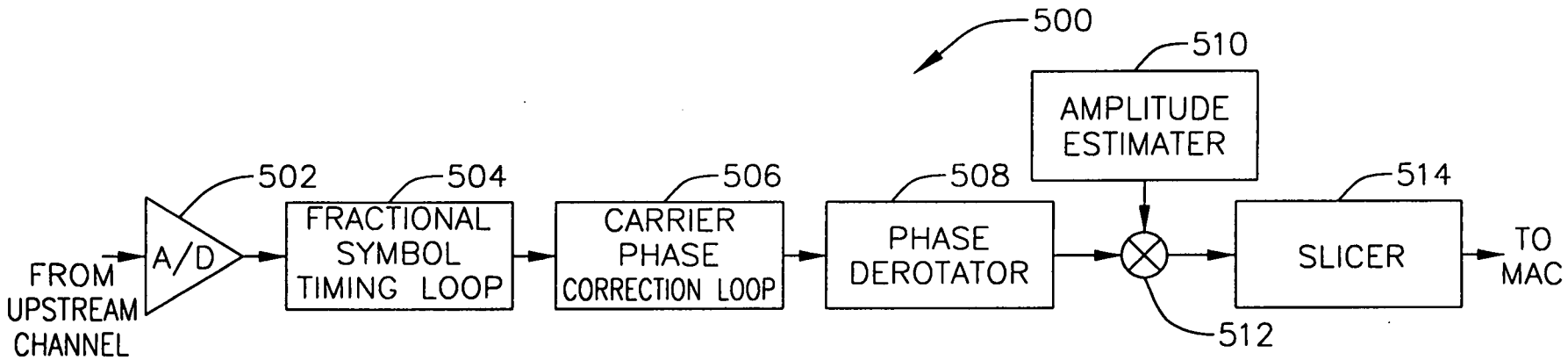


FIG. 8

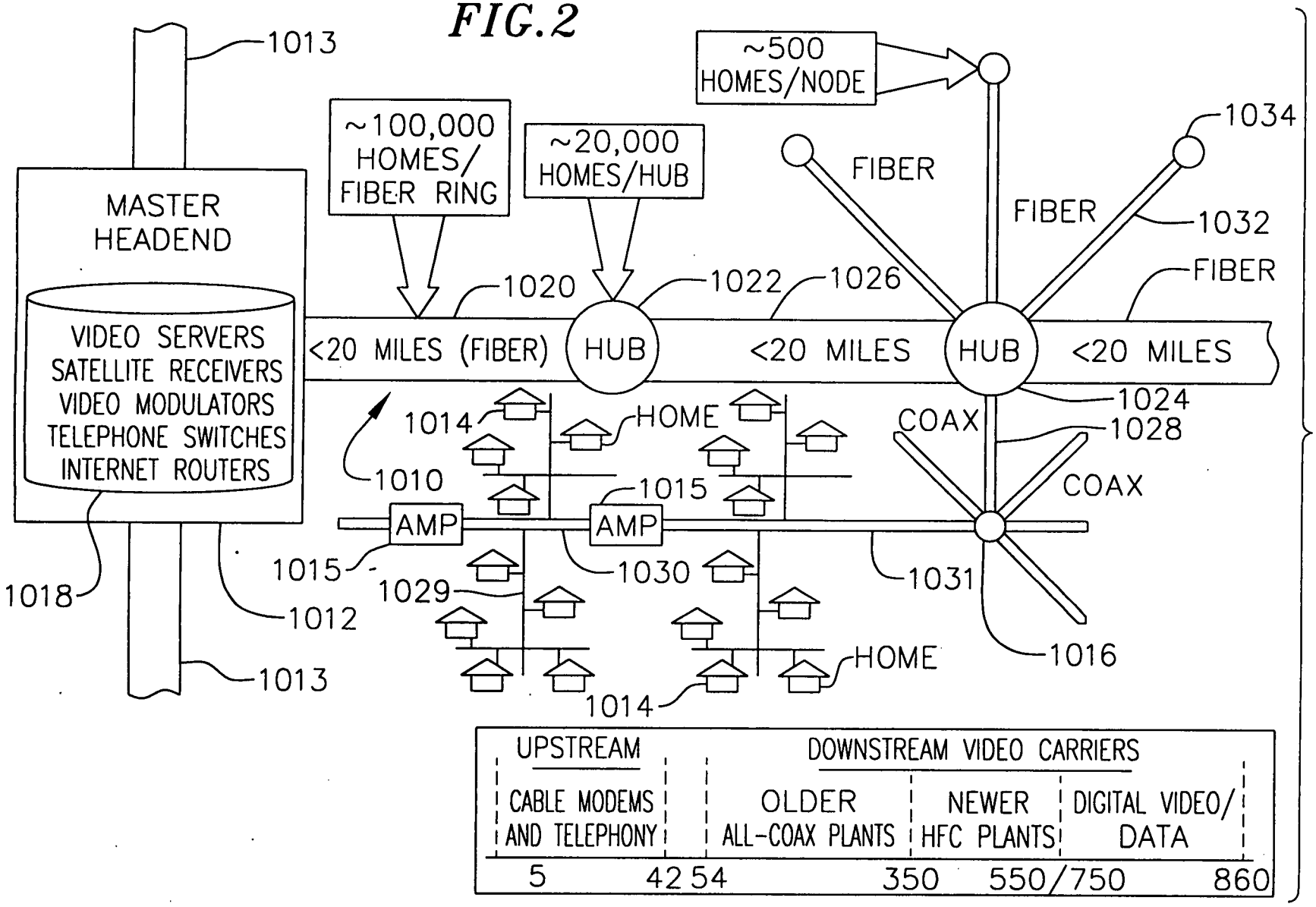
NETWORK DATA
TRANSMISSION
SYNCHRONIZATION SYSTEM
AND METHOD

FIG. 1



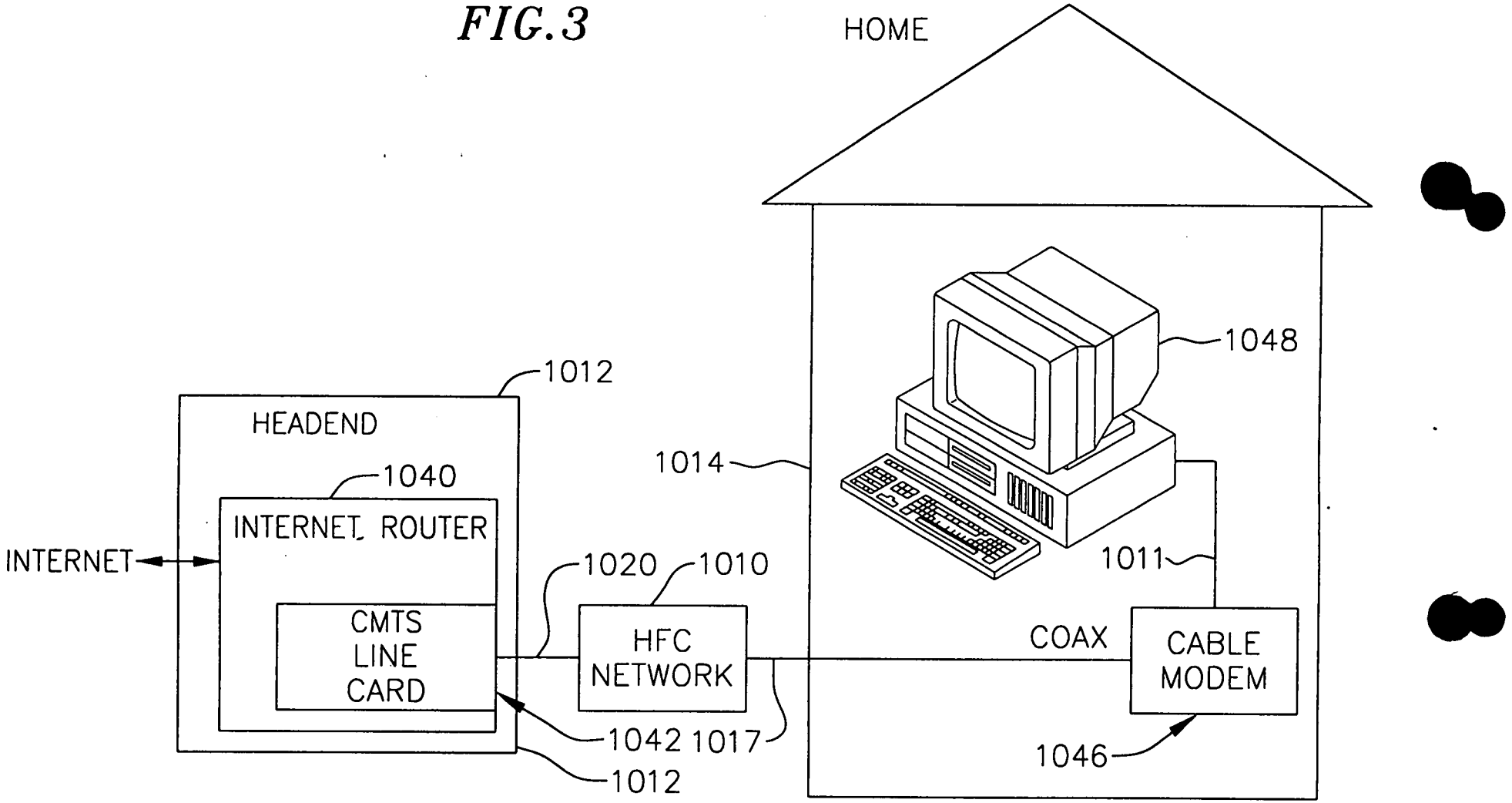
BURST RECEIVER FOR
CABLE MODEM SYSTEM

FIG.2



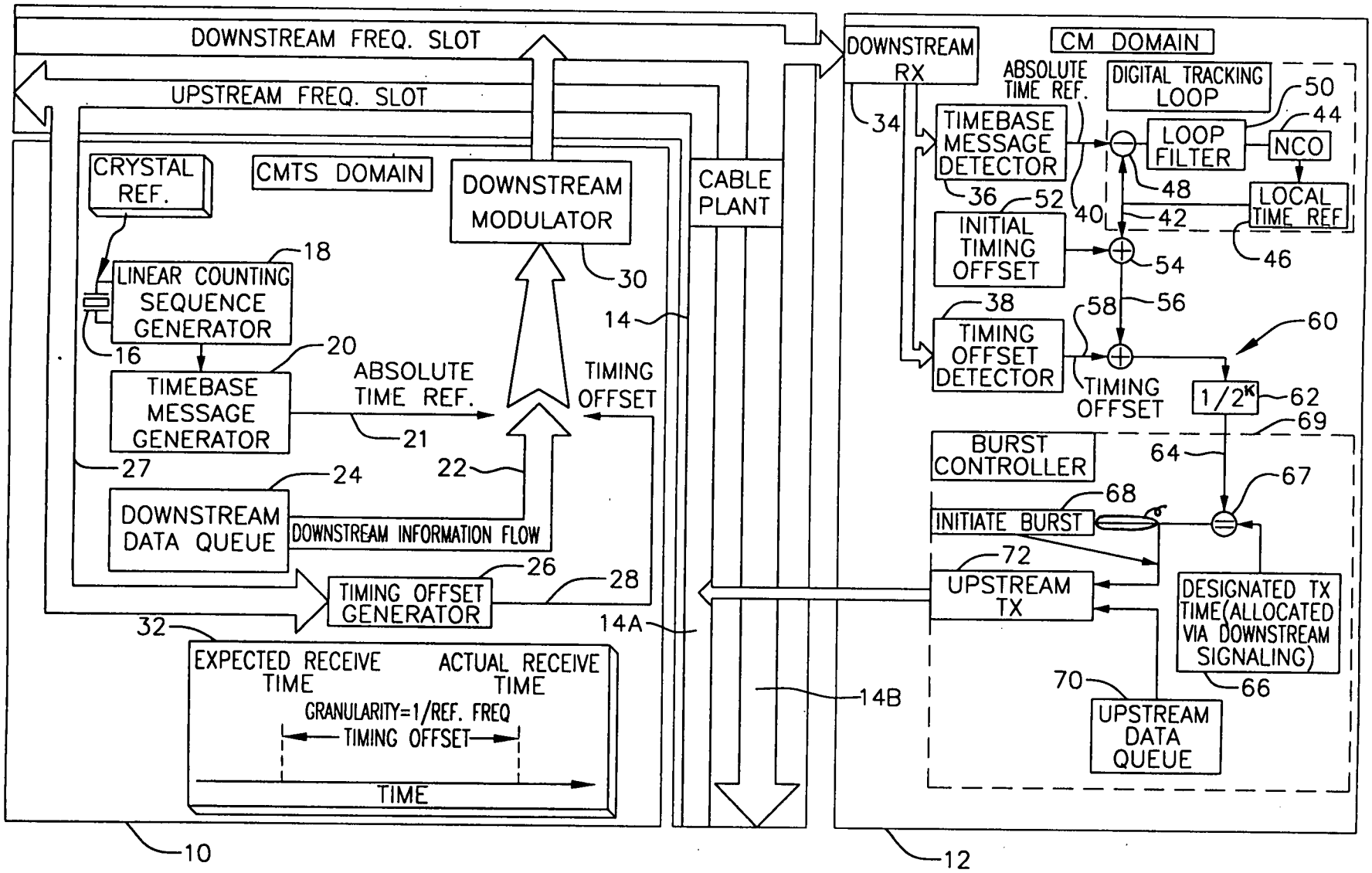
BURST RECEIVER FOR CABLE MODEM SYSTEM

FIG. 3



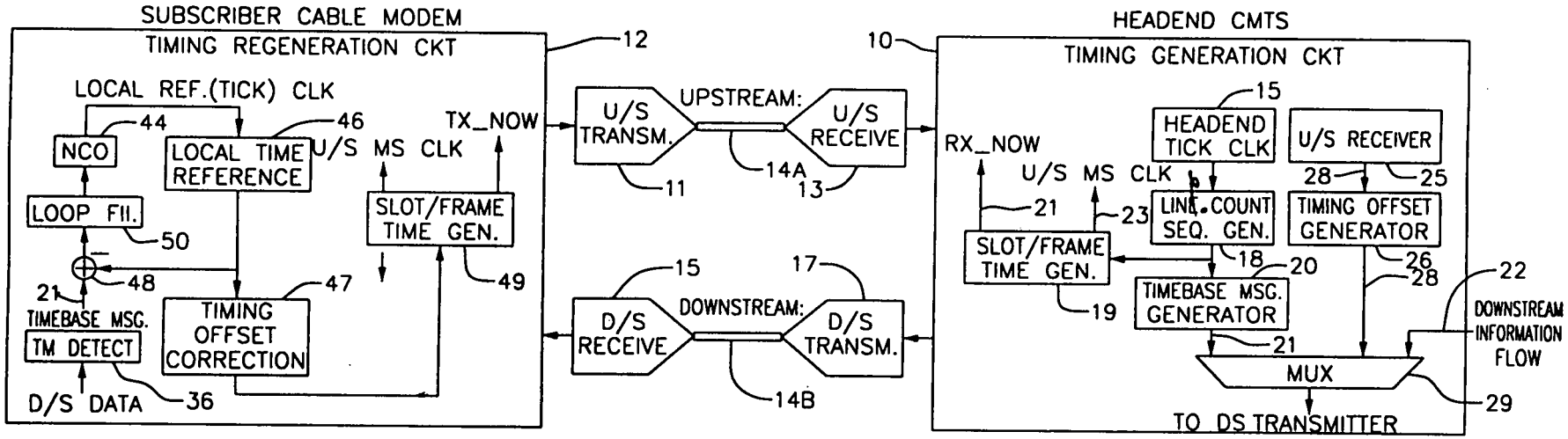
BURST RECEIVER FOR
CABLE MODEM SYSTEM

FIG. 4



BURST RECEIVER FOR CABLE MODEM SYSTEM

FIG.5



BURST RECEIVER FOR
CABLE MODEM SYSTEM

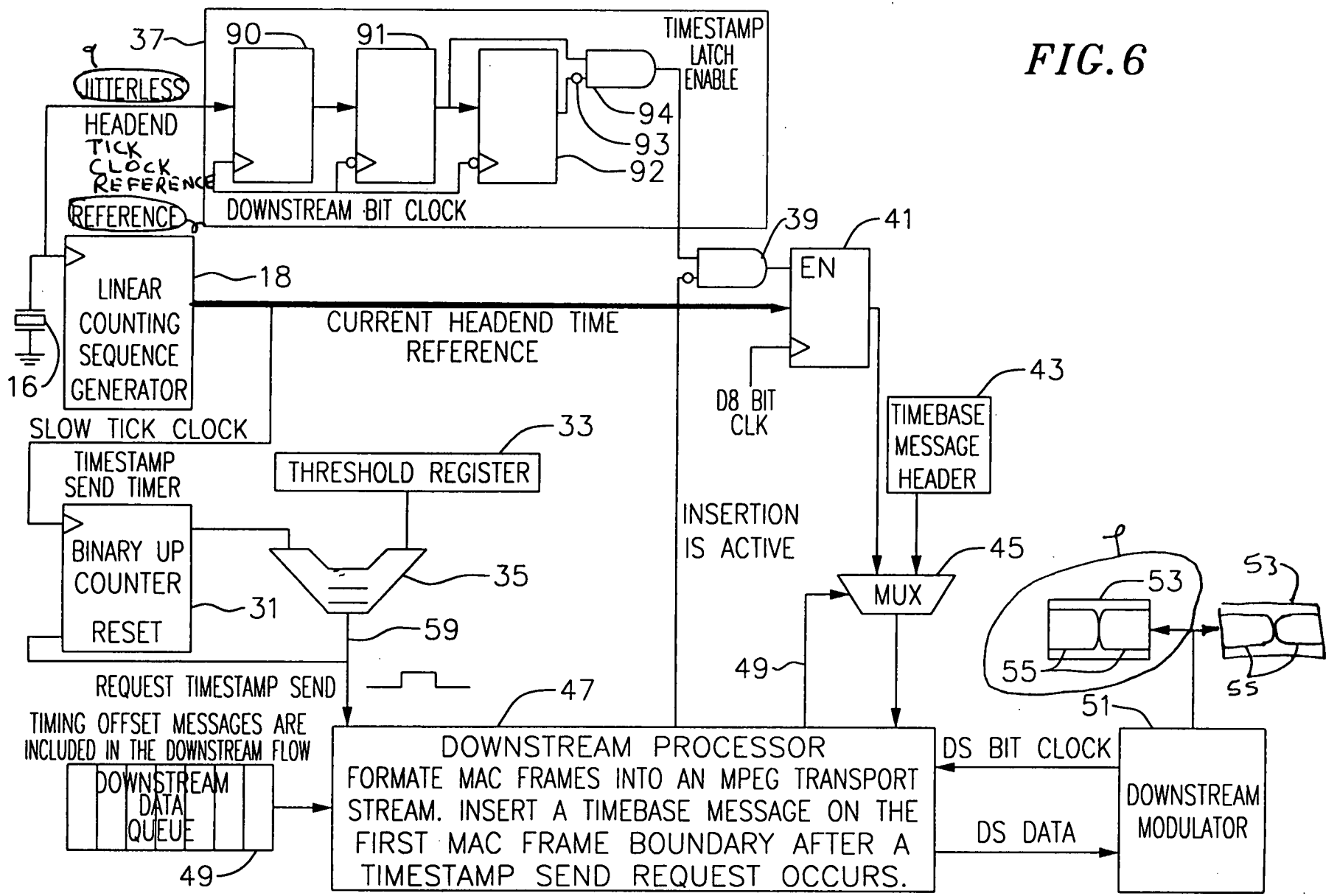
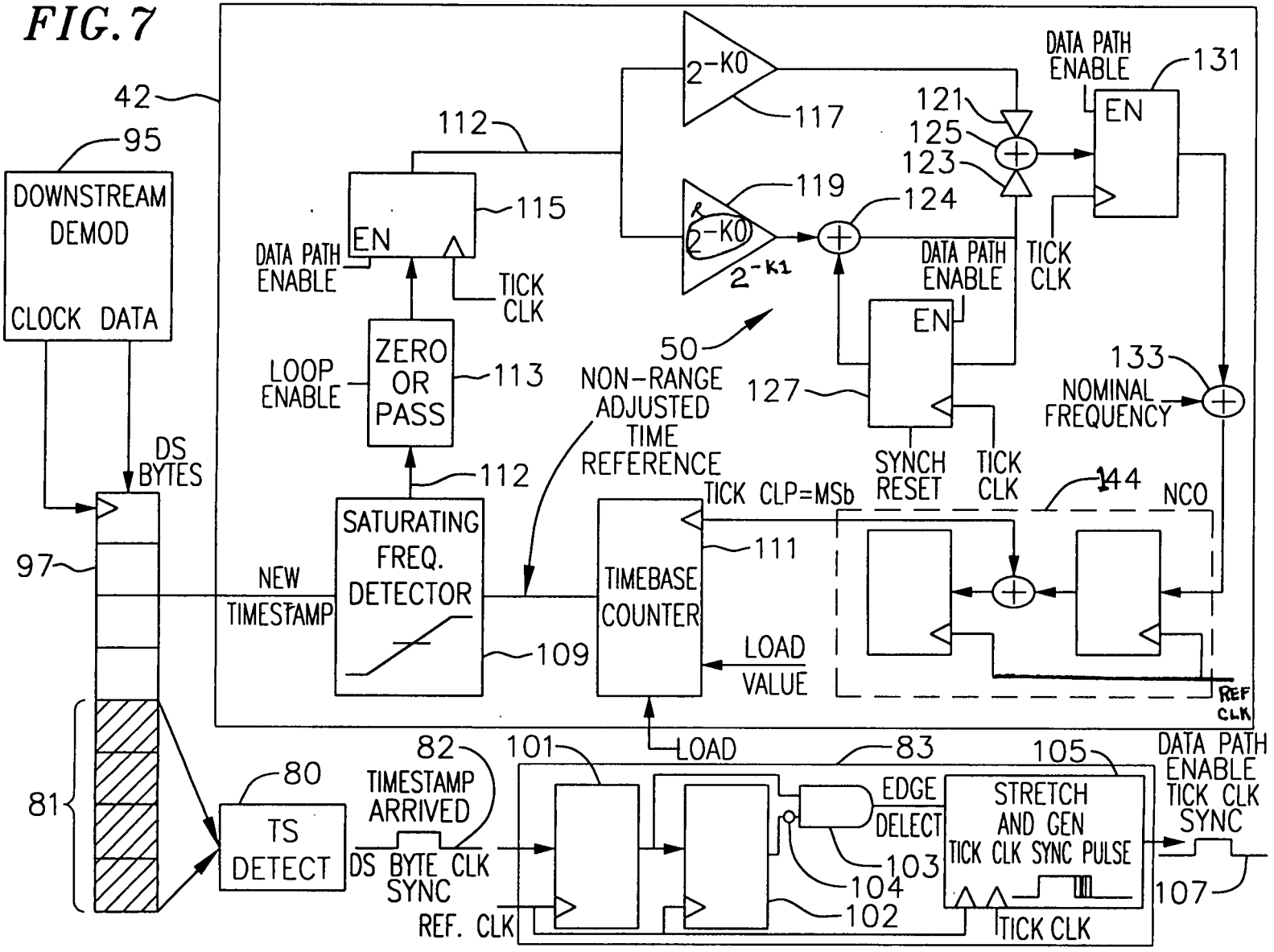


FIG. 6

BURST RECEIVER FOR CABLE MODEM SYSTEM

FIG. 7

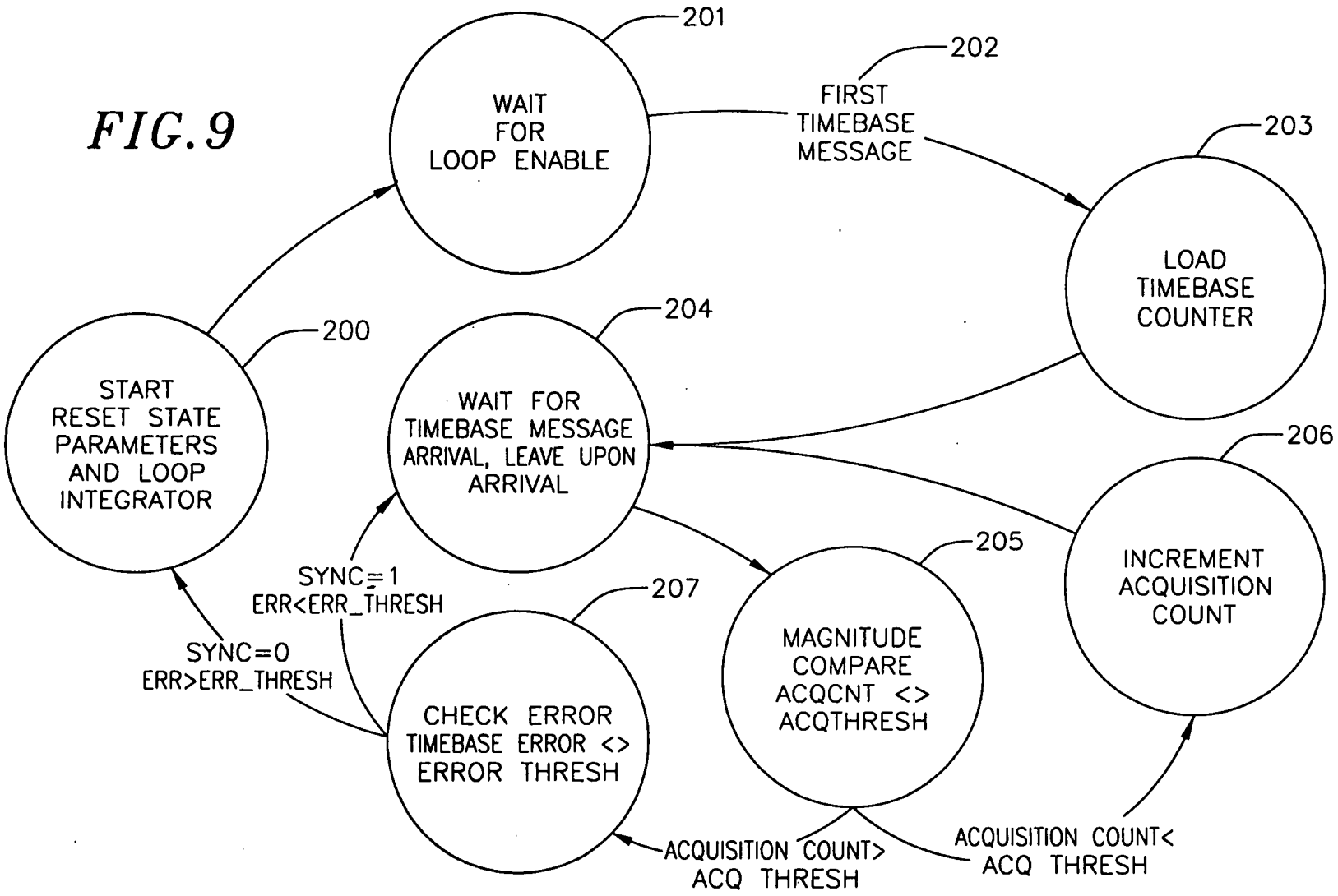


BURST RECEIVER FOR
CABLE MODEM SYSTEM

FIG.8

UPDATE RATE	COARSE COEFFS	FINE COEFFICIENTS
1kHz(1ms)	$K0=2^{-11}$ $K1=2^{-15}$ (BW=50Hz)	$K0=2^{-16}$ $K1=2^{-25}$ (BW=1Hz)
300Hz(3.3ms)	$K0=2^{-12}$ $K1=2^{-15}$ (BW=20Hz)	$K0=2^{-16}$ $K1=2^{-23}$ (BW=1Hz)
100Hz(10ms)	$K0=2^{-13}$ $K1=2^{-16}$ (BW=10Hz)	$K0=2^{-16}$ $K1=2^{-22}$ (BW=1Hz)
50Hz(20ms)	$K0=2^{-14}$ $K1=2^{-17}$ (BW=5Hz)	$K0=2^{-16}$ $K1=2^{-21}$ (BW=1Hz)
30Hz(33ms)	$K0=2^{-15}$ $K1=2^{-18}$ (BW=3Hz)	$K0=2^{-17}$ $K1=2^{-21}$ (BW=1Hz)
10Hz(100ms)	$K0=2^{-17}$ $K1=2^{-20}$ (BW=1Hz)	$K0=2^{-17}$ $K1=2^{-20}$ (BW=1Hz)
5Hz(200ms)	$K0=2^{-18}$ $K1=2^{-20}$ (BW=1Hz)	$K0=2^{-18}$ $K1=2^{-20}$ (BW=1Hz)

FIG. 9



BURST RECEIVER FOR CABLE MODEM SYSTEM

FIG. 10

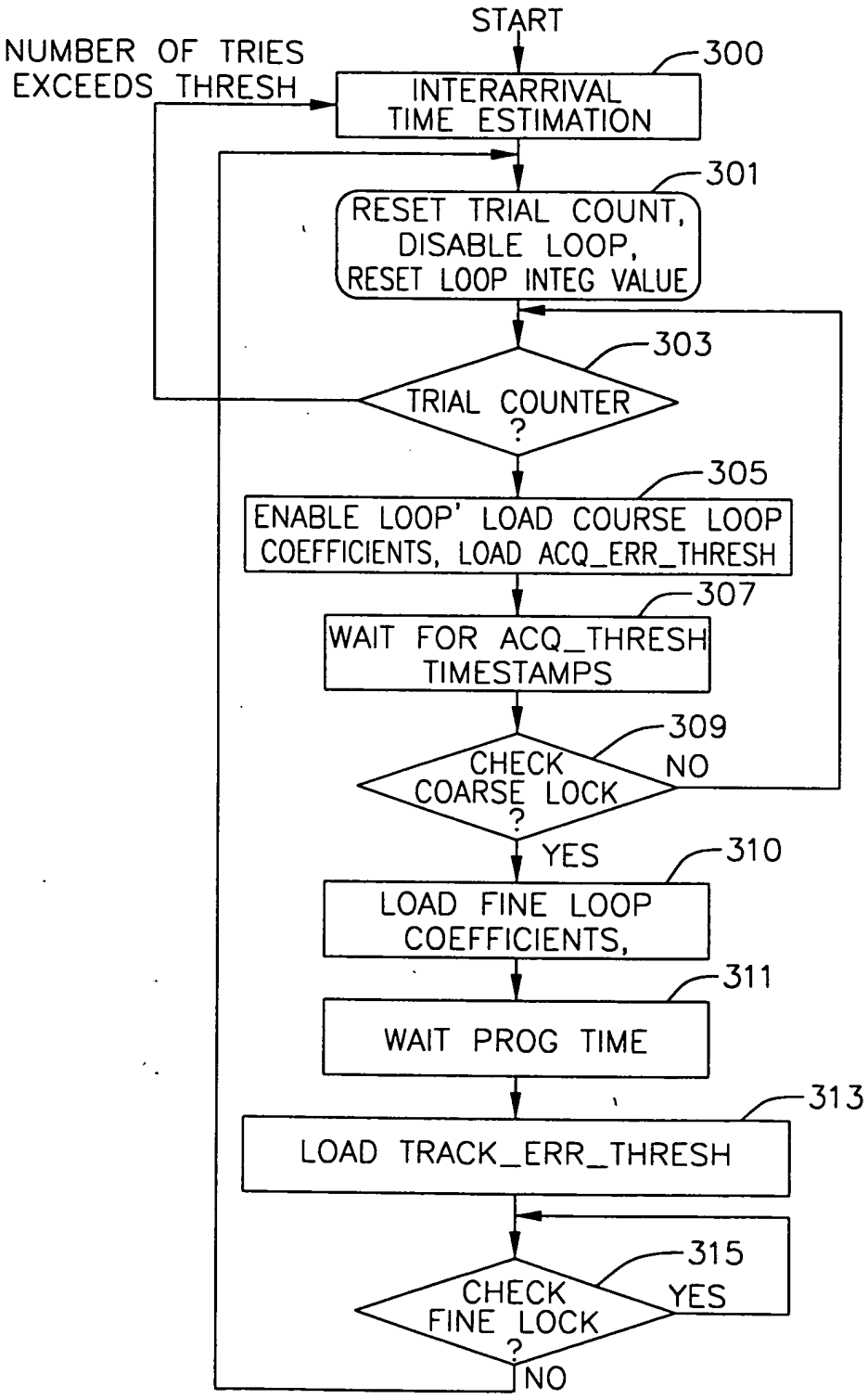
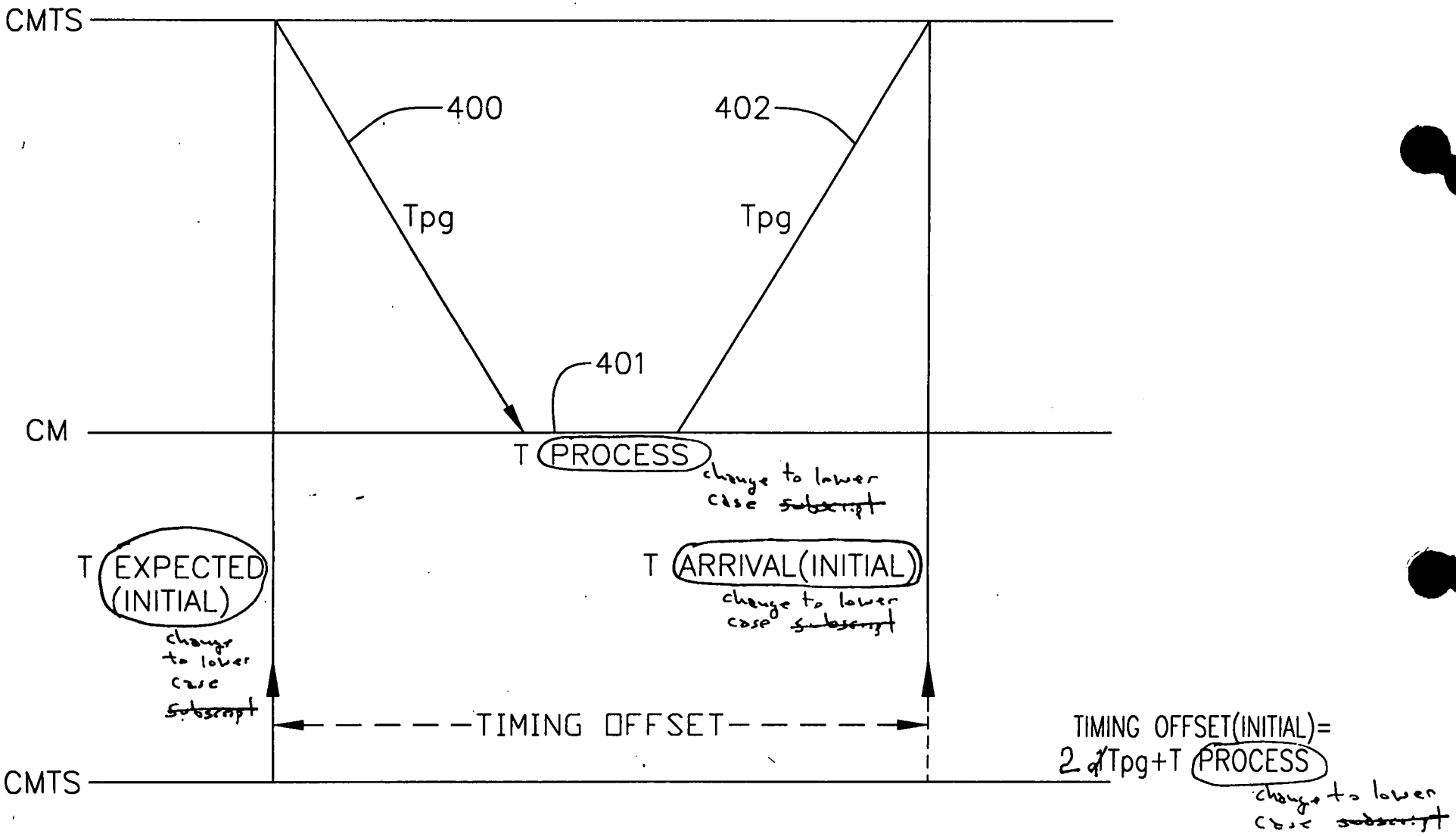
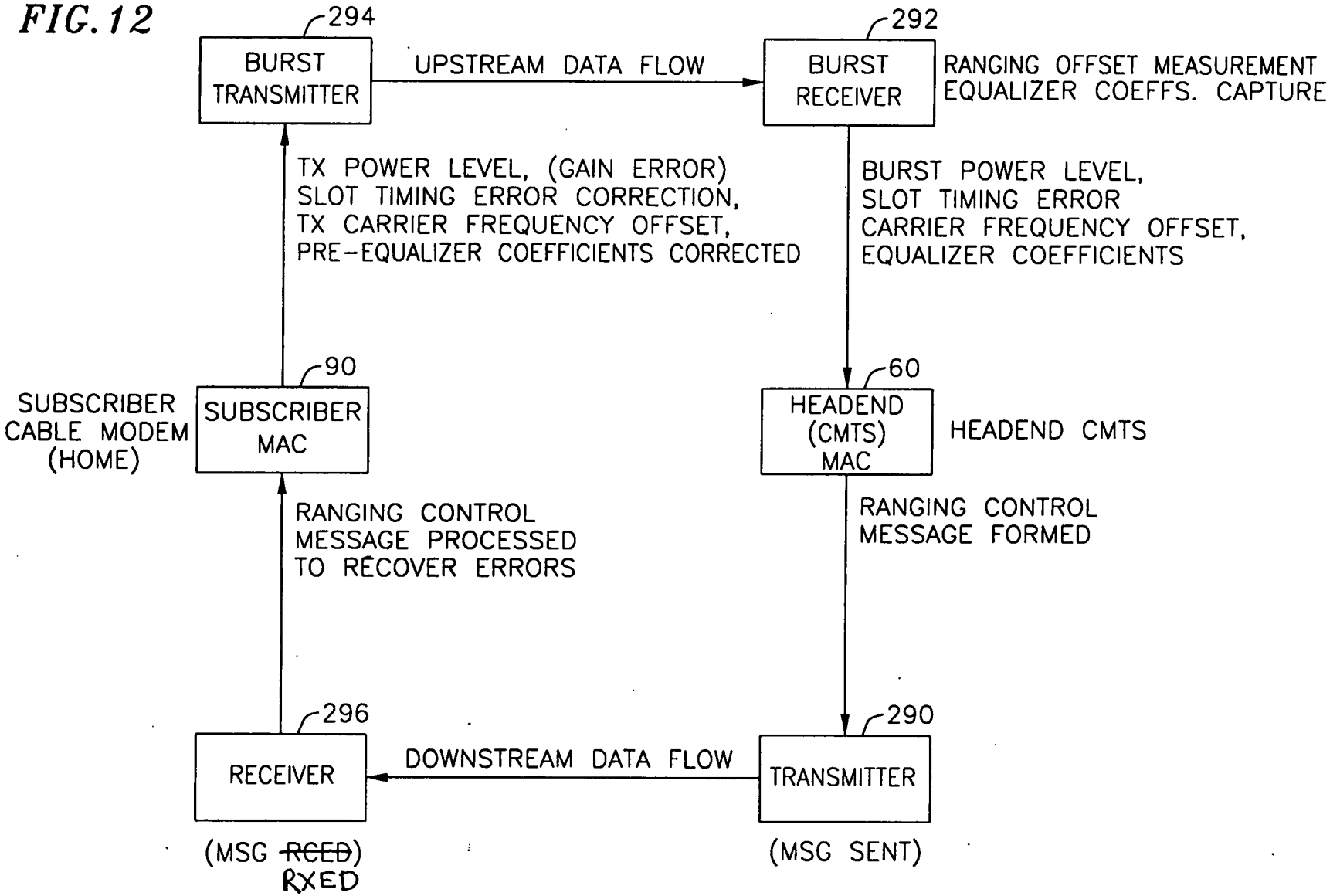

START
NUMBER OF TRIES EXCEEDS THRESH
300
INTERARRIVAL TIME ESTIMATION
301
RESET TRIAL COUNT, DISABLE LOOP, RESET LOOP INTEG VALUE
303
TRIAL COUNTER ?
305
ENABLE LOOP' LOAD COURSE LOOP COEFFICIENTS, LOAD ACQ_ERR_THRESH
307
WAIT FOR ACQ_THRESH TIMESTAMPS
309
CHECK COARSE LOCK ?
NO
YES
310
LOAD FINE LOOP COEFFICIENTS,
311
WAIT PROG TIME
313
LOAD TRACK_ERR_THRESH
315
CHECK FINE LOCK ?
YES
NO

FIG. 11



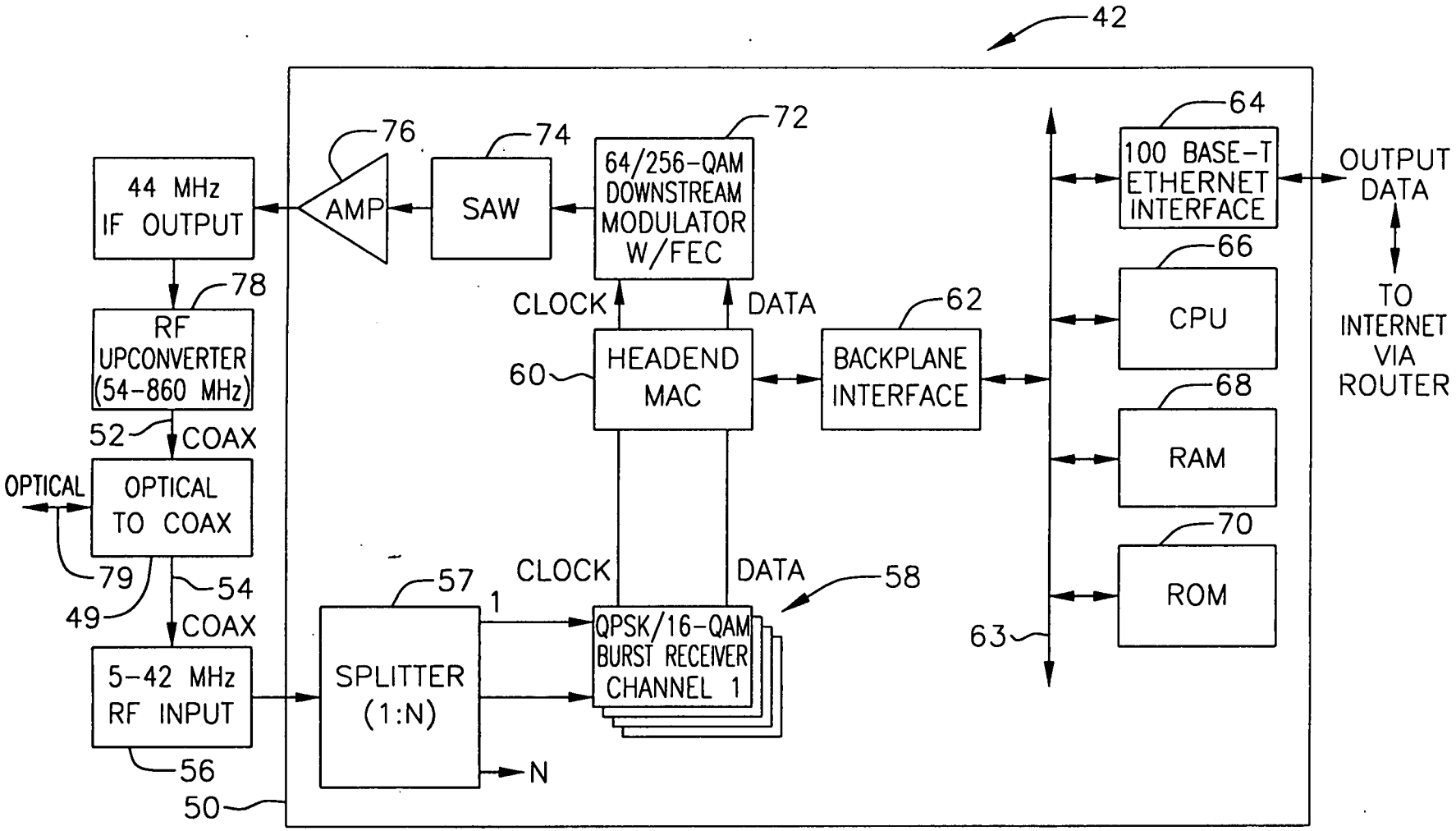
BURST RECEIVER FOR
CABLE MODEM SYSTEM

FIG. 12



BURST RECEIVER FOR
CABLE MODEM SYSTEM

FIG. 13



BURST RECEIVER FOR CABLE MODEM SYSTEM

FIG. 14
PRIOR ART

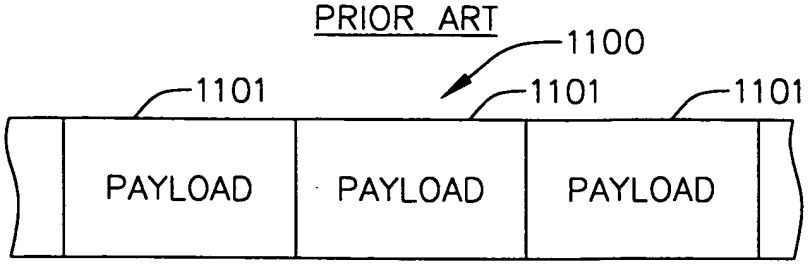


FIG. 15

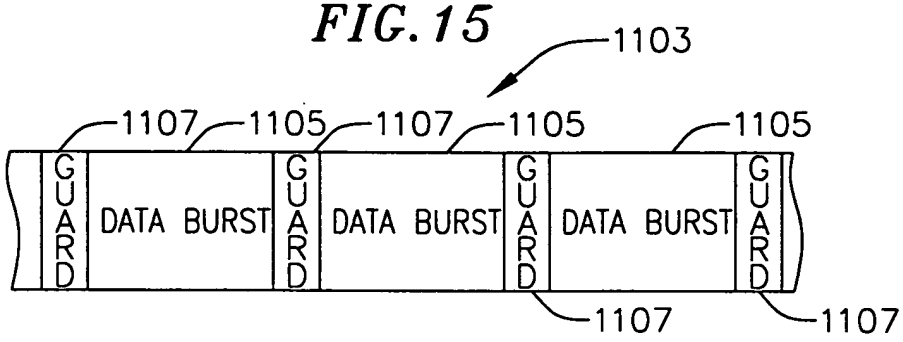


FIG. 16

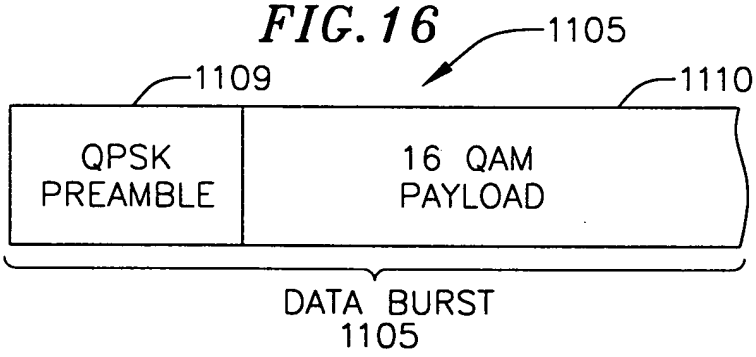


FIG. 17

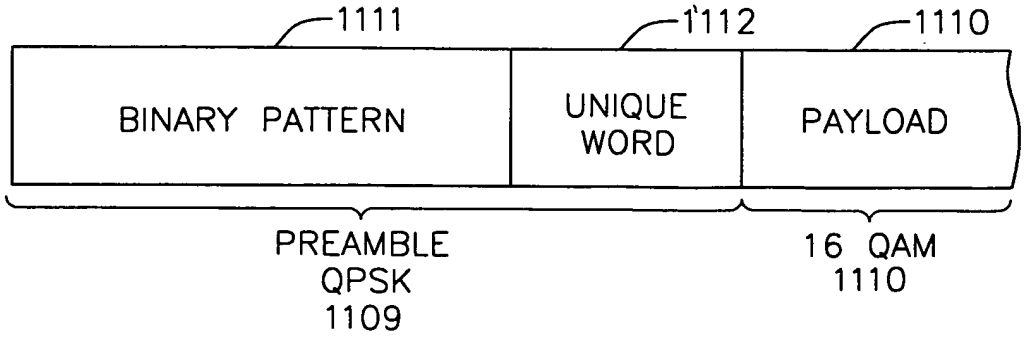


FIG. 18
PRIOR ART

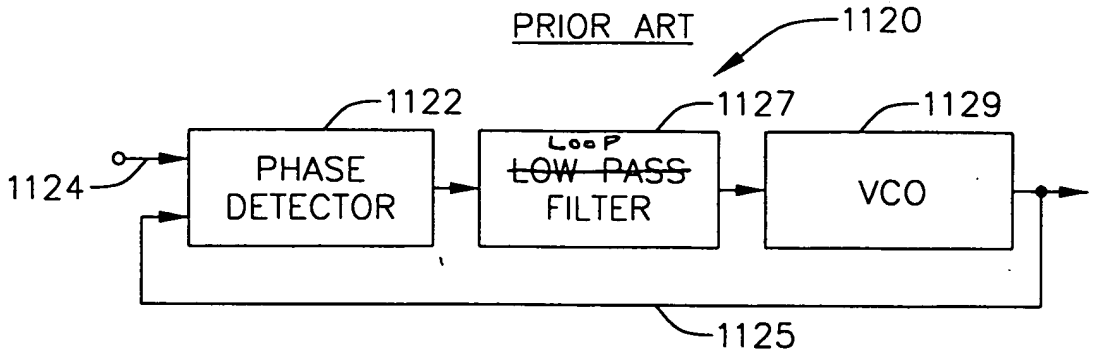


FIG. 19

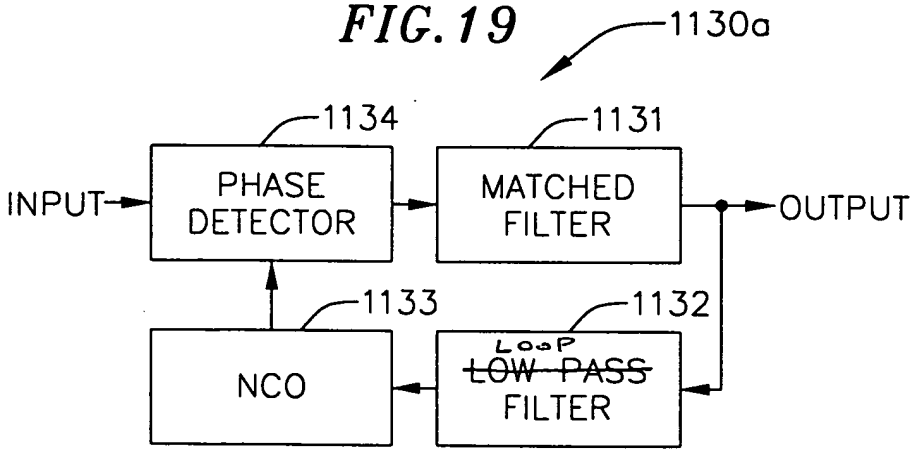
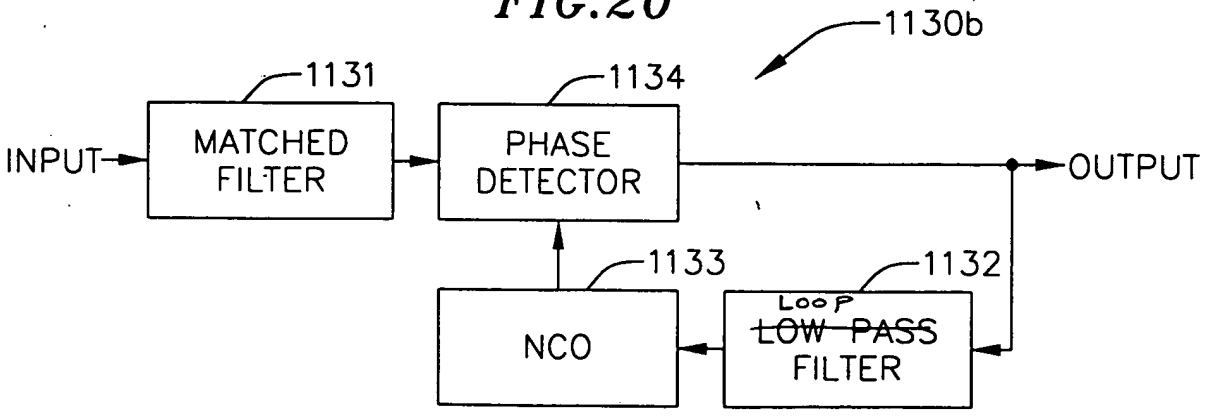
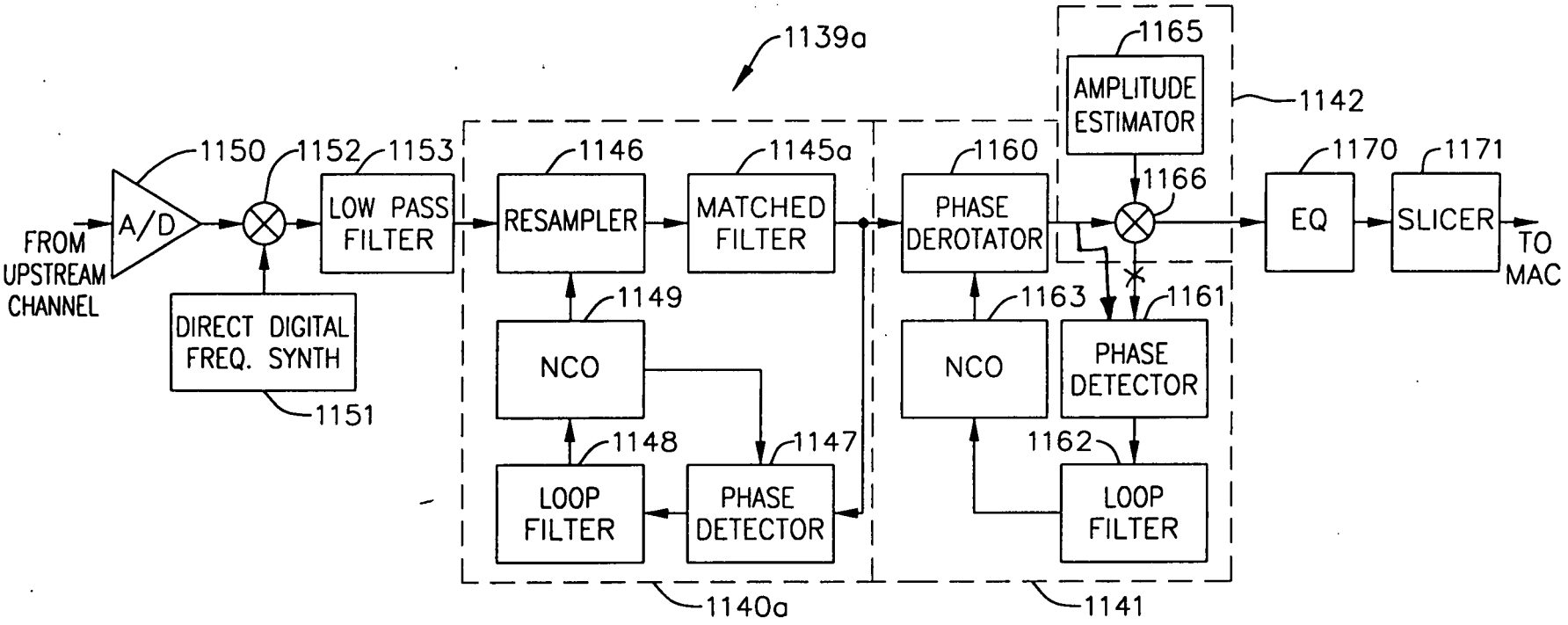


FIG. 20



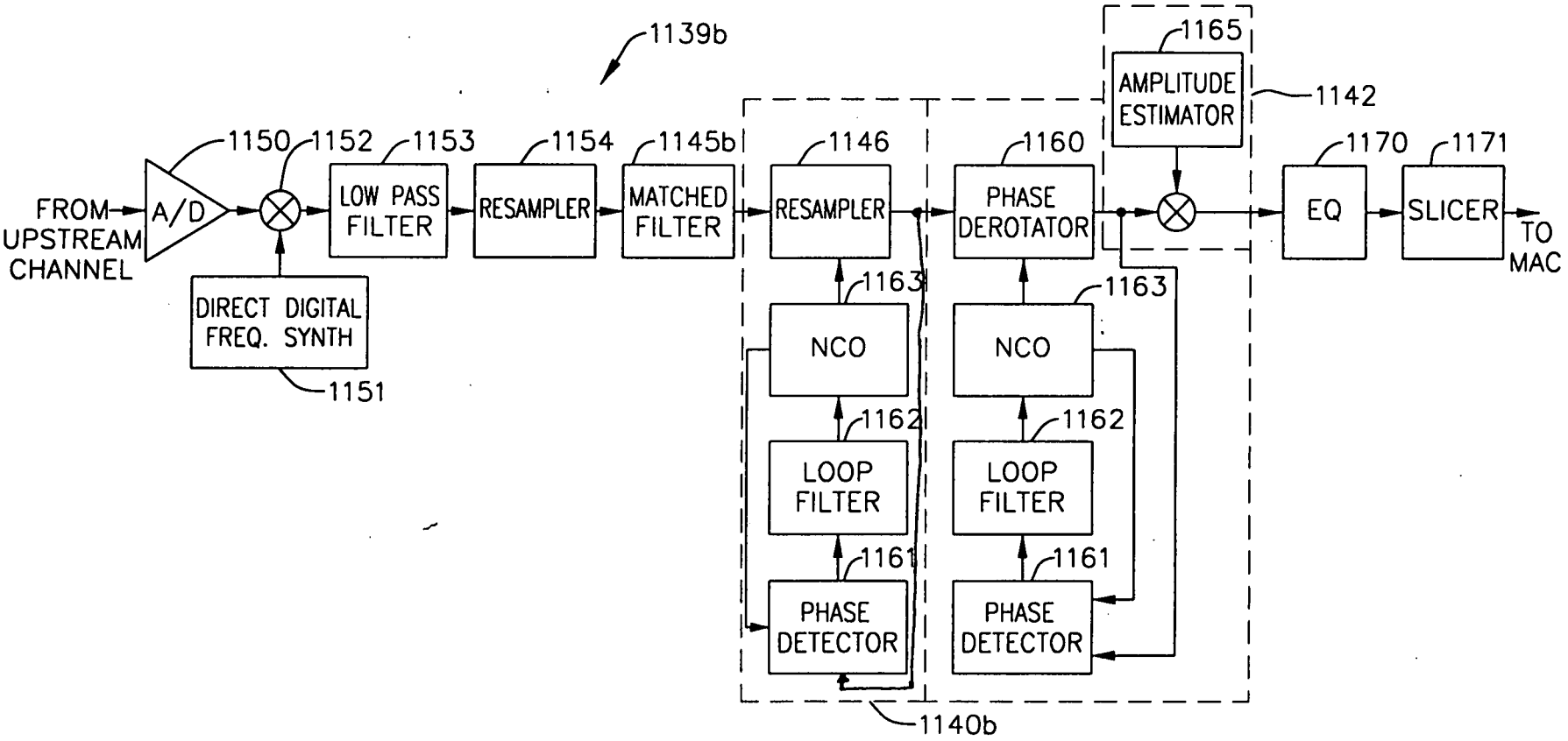
BURST RECEIVER FOR
CABLE MODEM SYSTEM

FIG.21



BURST RECEIVER FOR CABLE MODEM SYSTEM

FIG.22



BURST RECEIVER FOR CABLE MODEM SYSTEM

FIG.23

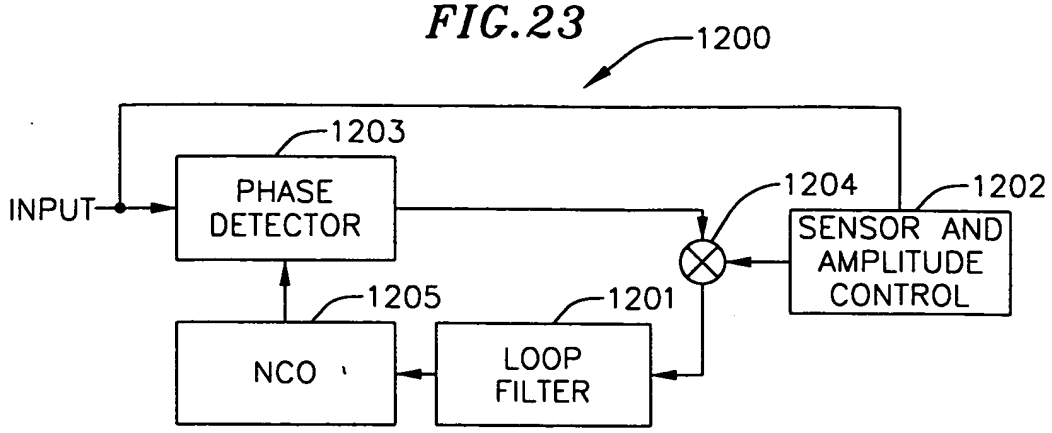


FIG.24

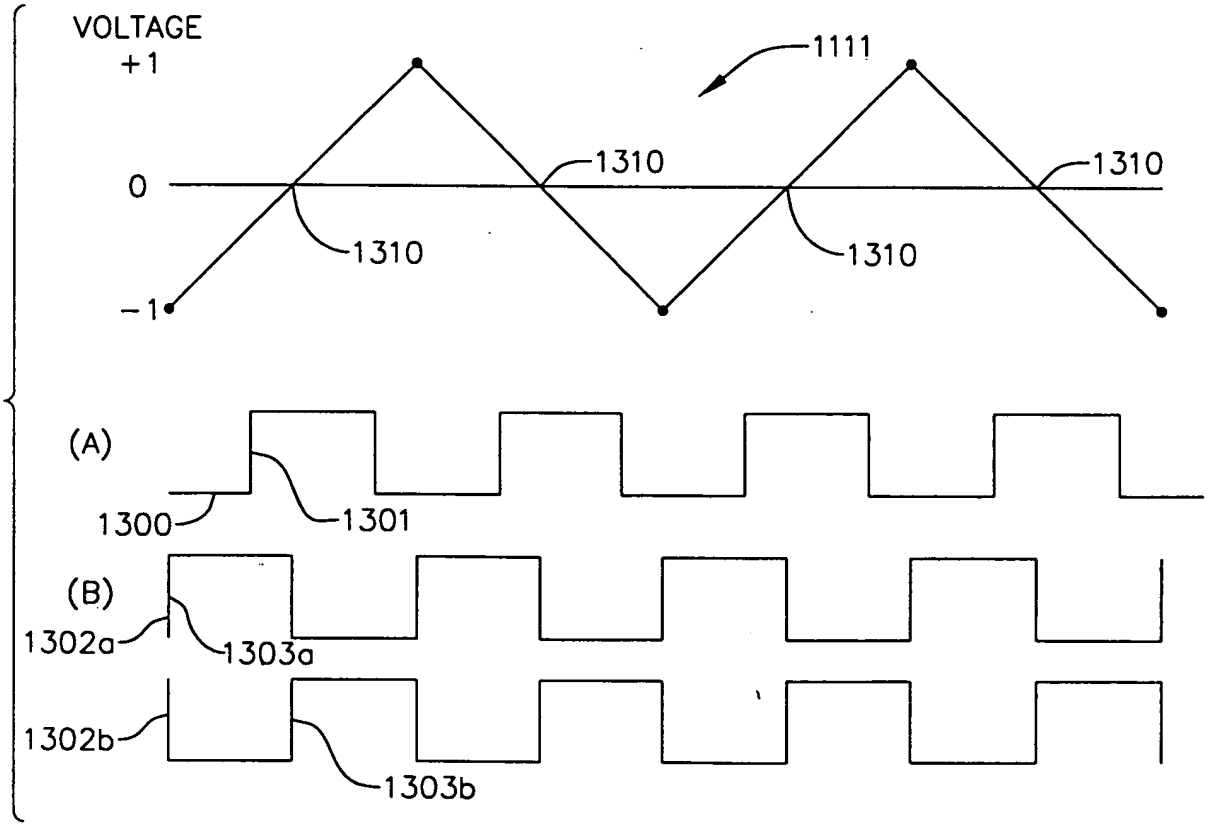


FIG.25

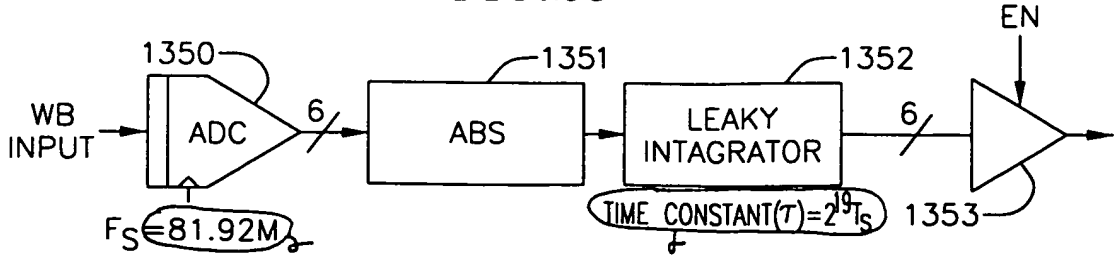
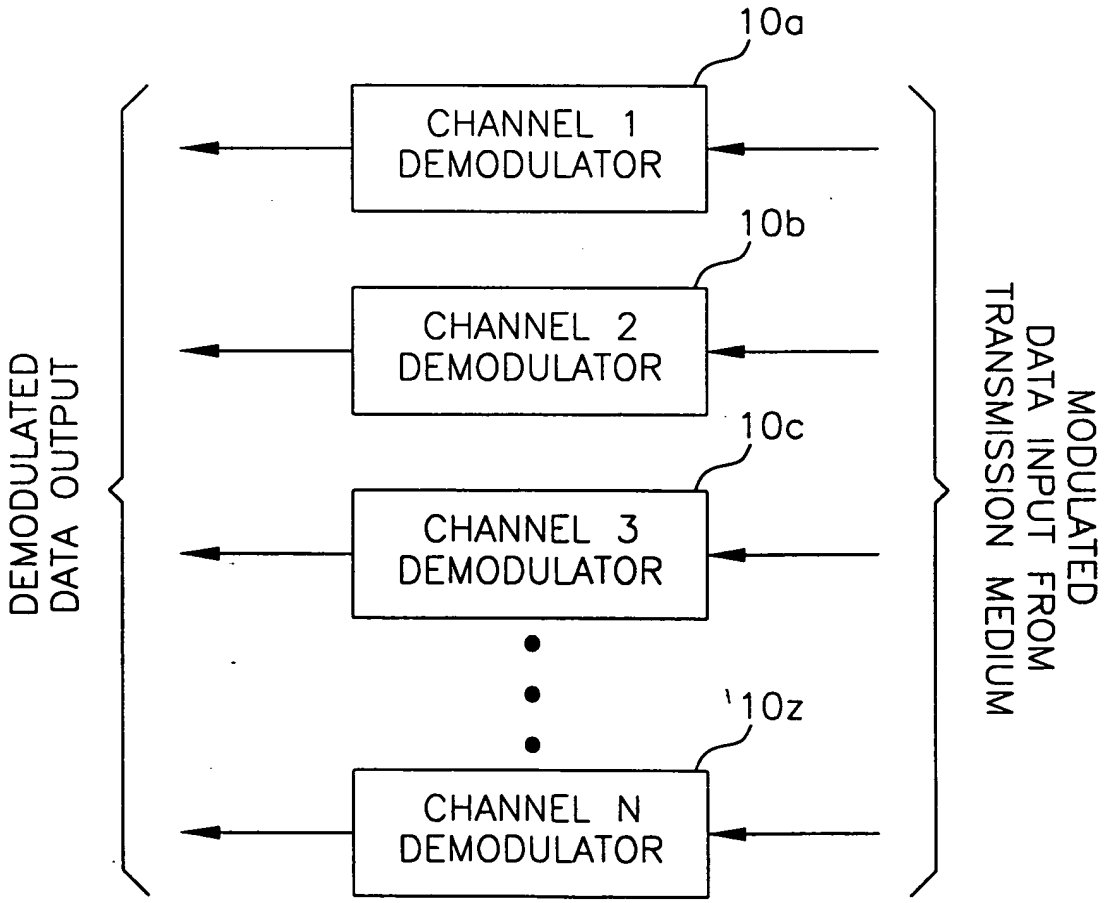


FIG. 1
PRIOR ART



ROBUST TECHNIQUES FOR OPTIMAL UPSTREAM COMMUNICATION

FIG. 2

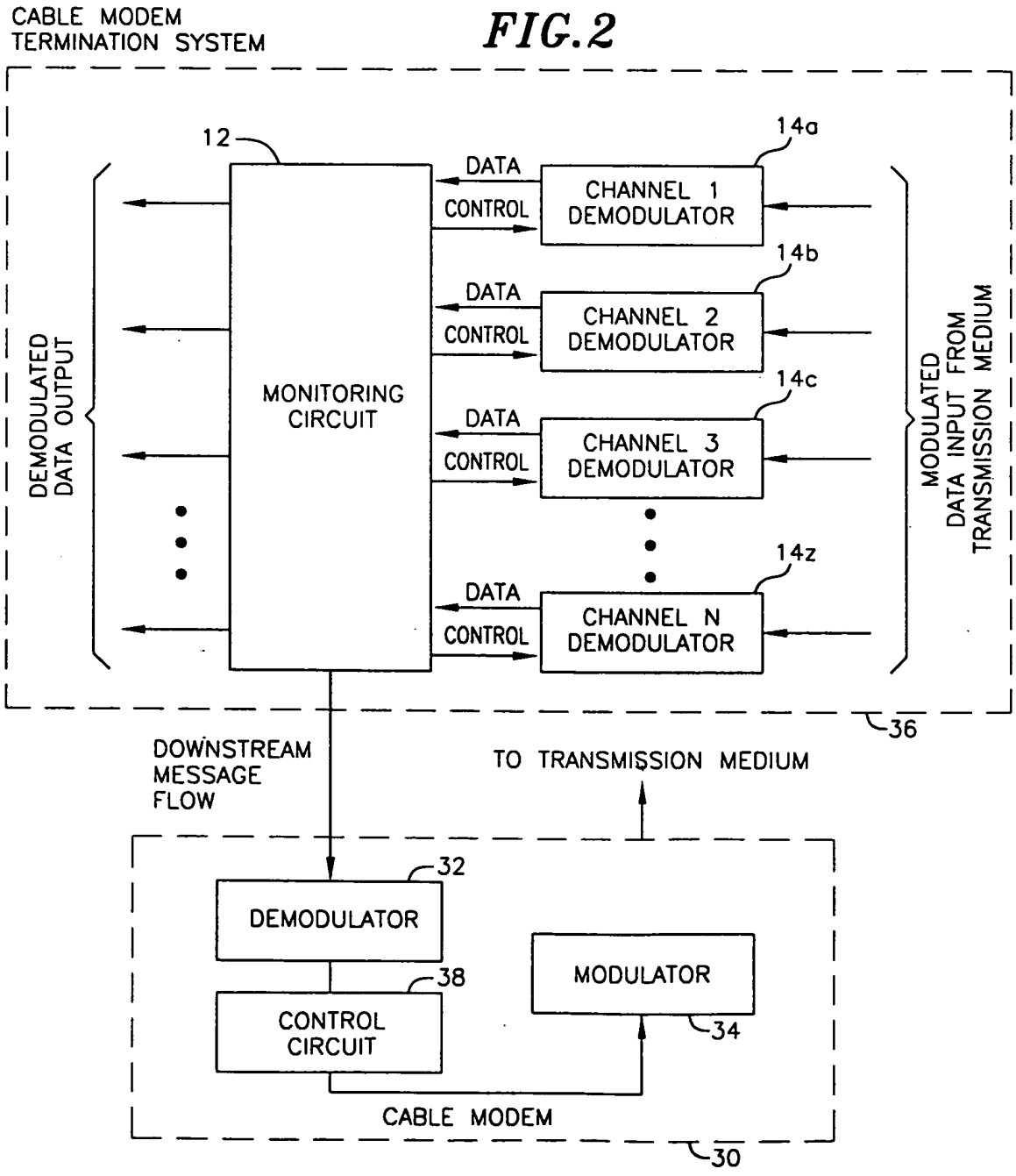
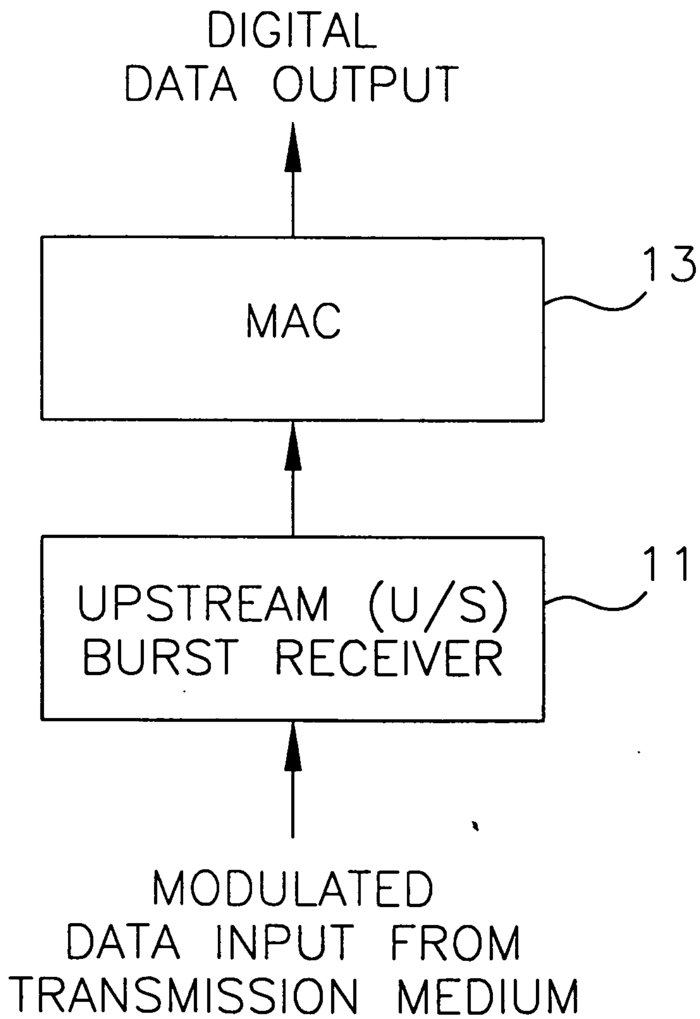
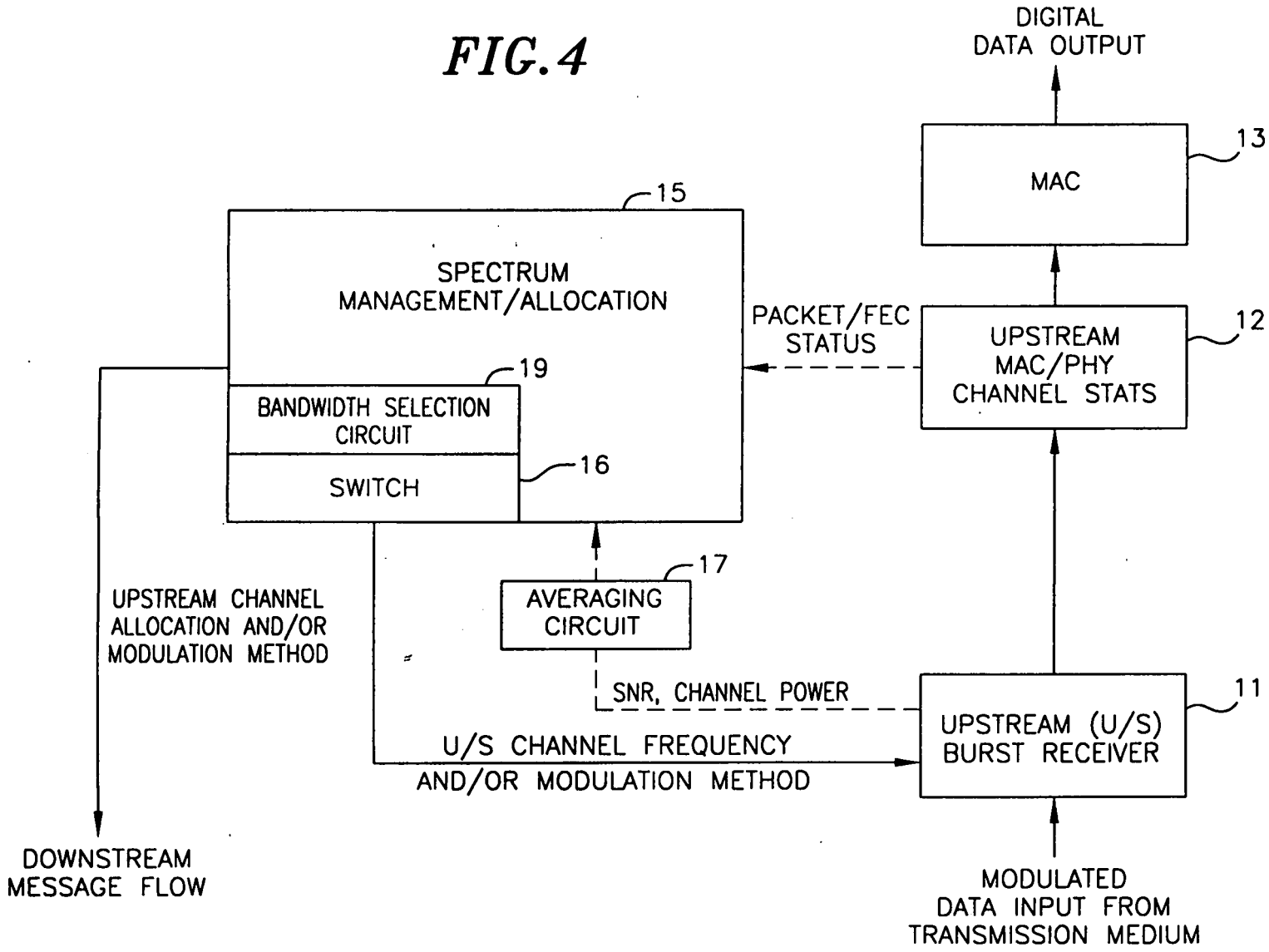

CABLE MODEM
TERMINATION SYSTEM
12
MONITORING
CIRCUIT
DEMODULATED
DATA OUTPUT
DATA
CONTROL
14a
CHANNEL 1
DEMODULATOR
14b
CHANNEL 2
DEMODULATOR
14c
CHANNEL 3
DEMODULATOR
14z
CHANNEL N
DEMODULATOR
MODULATED
DATA INPUT FROM
TRANSMISSION MEDIUM
36
DOWNSTREAM
MESSAGE
FLOW
TO TRANSMISSION MEDIUM
32
DEMODULATOR
38
CONTROL
CIRCUIT
MODULATOR
34
CABLE MODEM
30

FIG.3
PRIOR ART



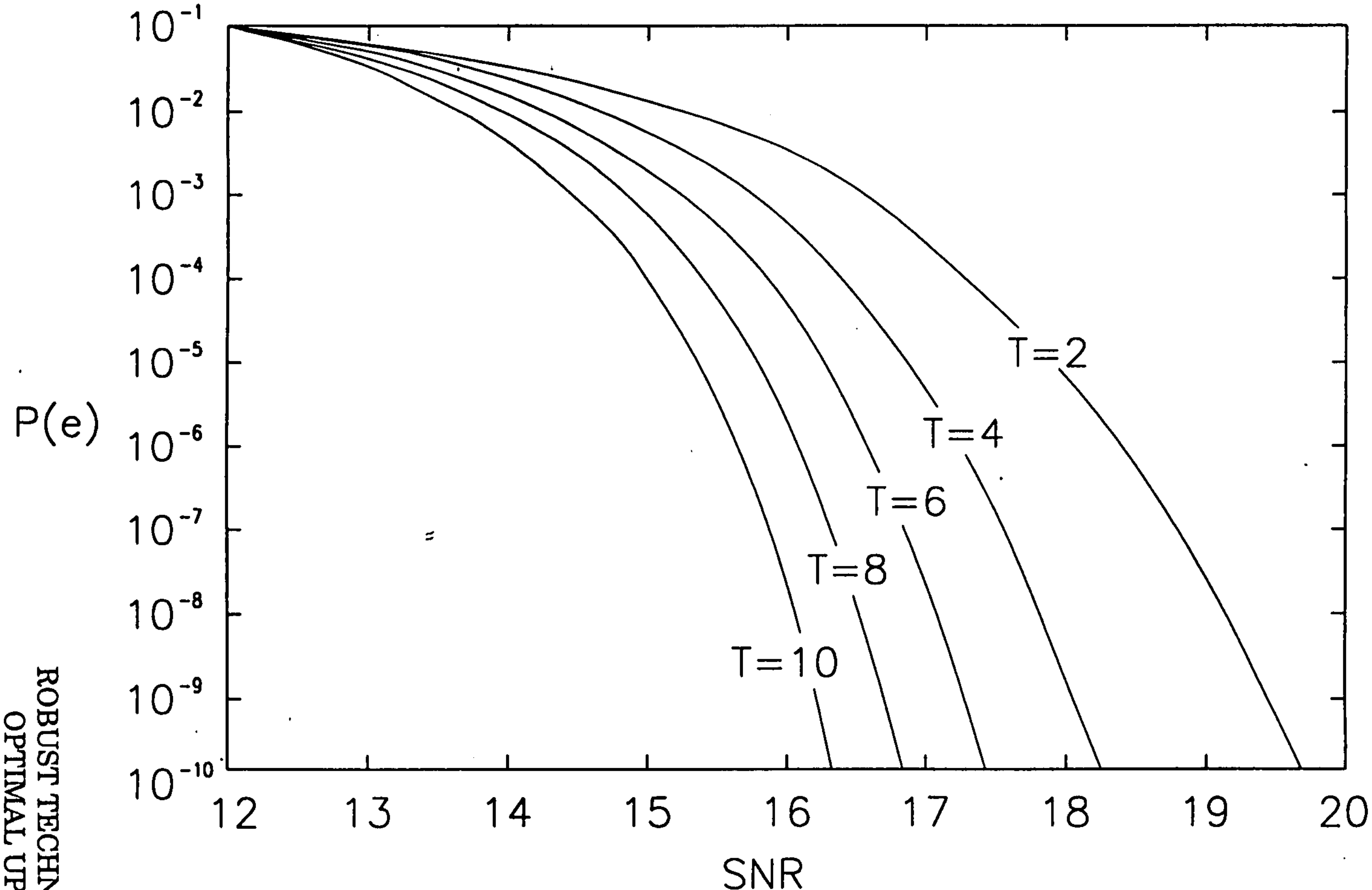
ROBUST TECHNIQUES FOR
OPTIMAL UPSTREAM
COMMUNICATION

FIG.4



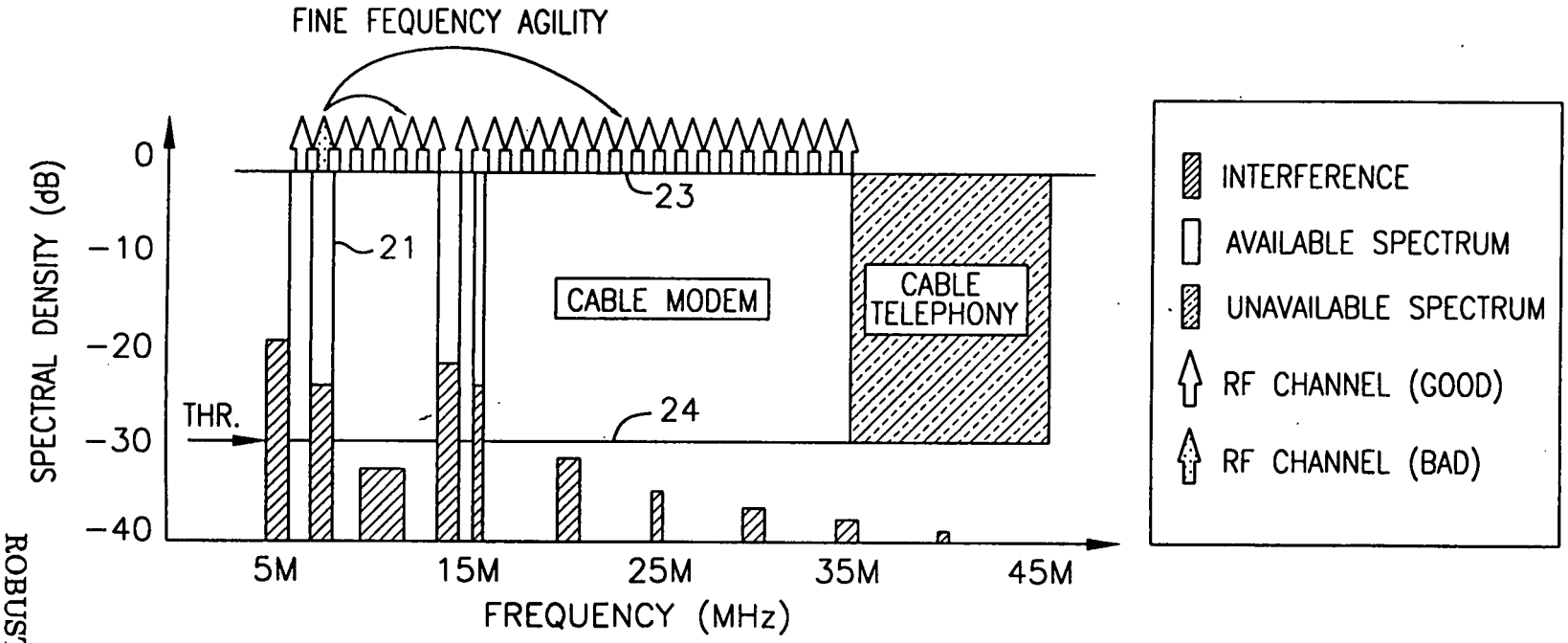
ROBUST TECHNIQUES FOR
OPTIMAL UPSTREAM
COMMUNICATION

FIG.5



ROBUST TECHNIQUES FOR
OPTIMAL UPSTREAM
COMMUNICATION

FIG.6



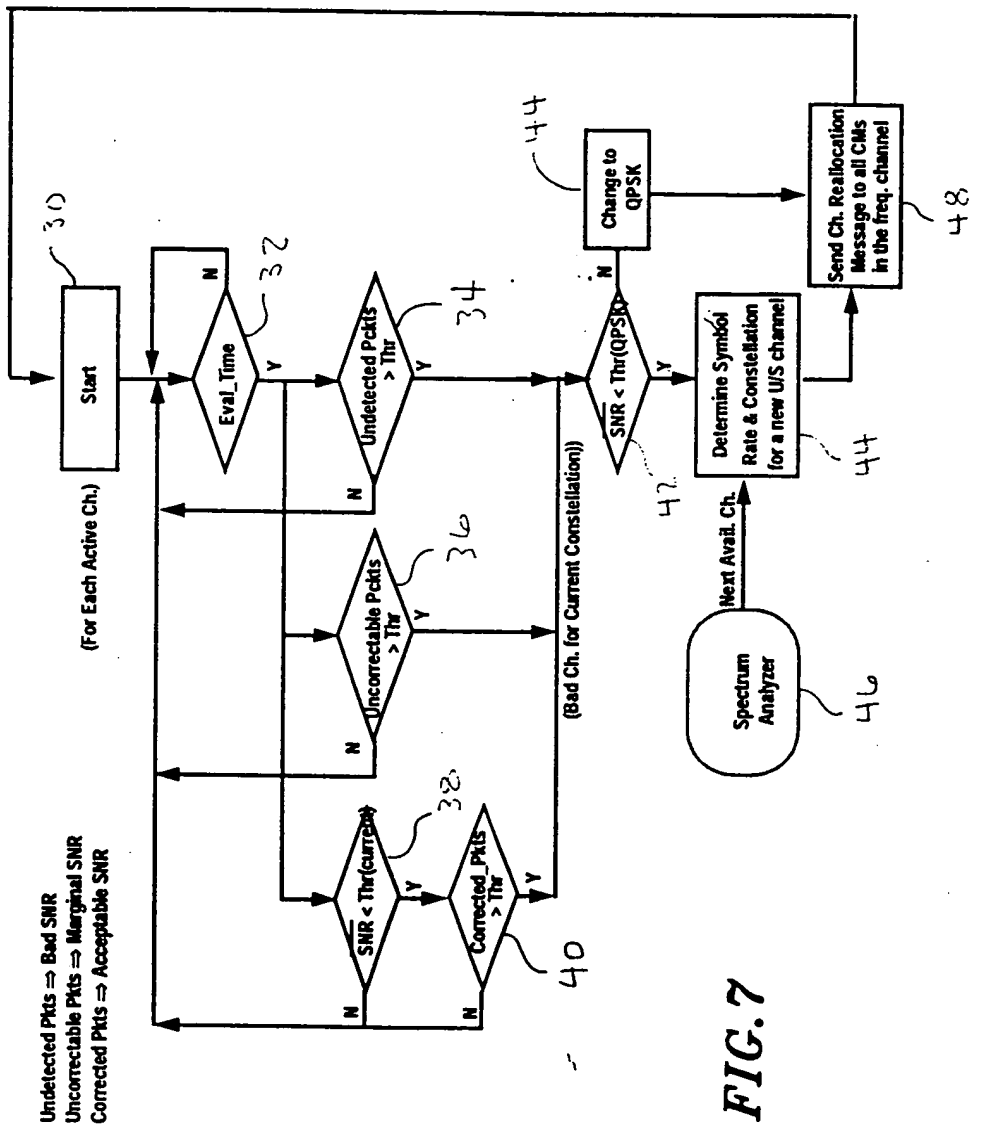
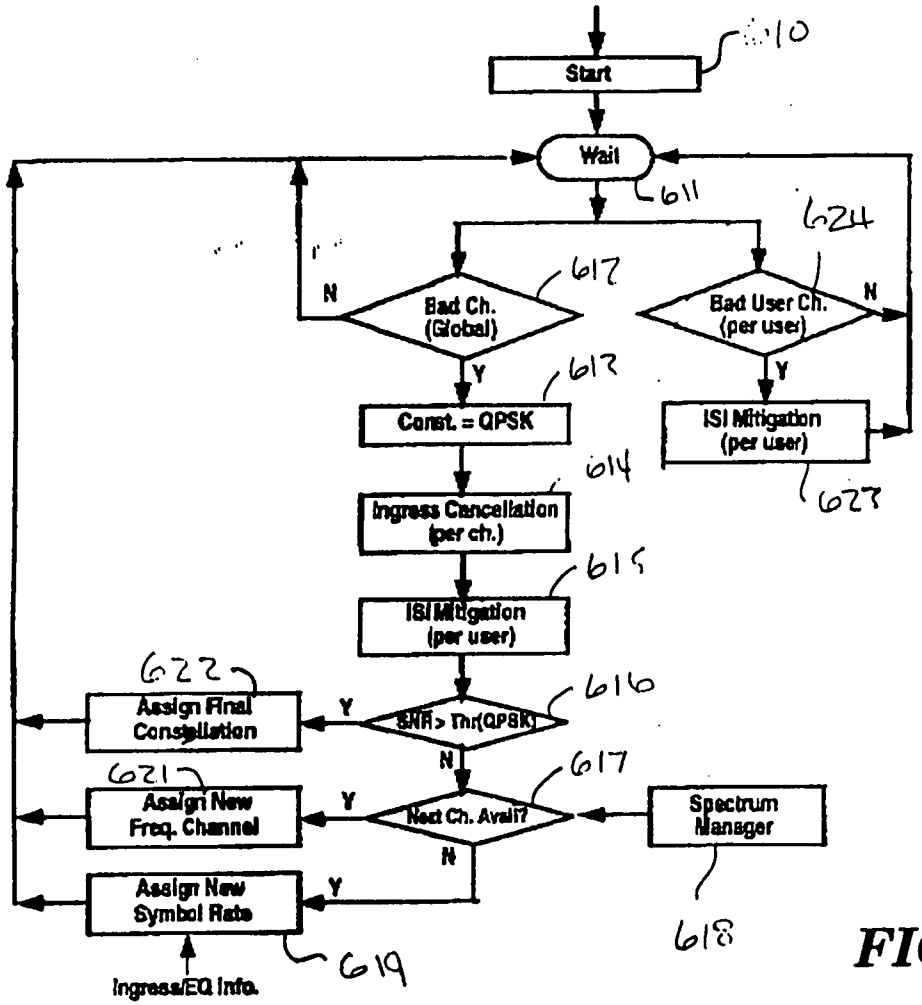


FIG. 7

ROBUST TECHNIQUES FOR OPTIMAL UPSTREAM COMMUNICATION



Channel Quality Evaluation Criteria:

Undetected Pkts ⇒ Bad SNR
Uncorrectable Pkts ⇒ Marginal SNR
Corrected Pkts ⇒ Acceptable SNR

FIG. 8

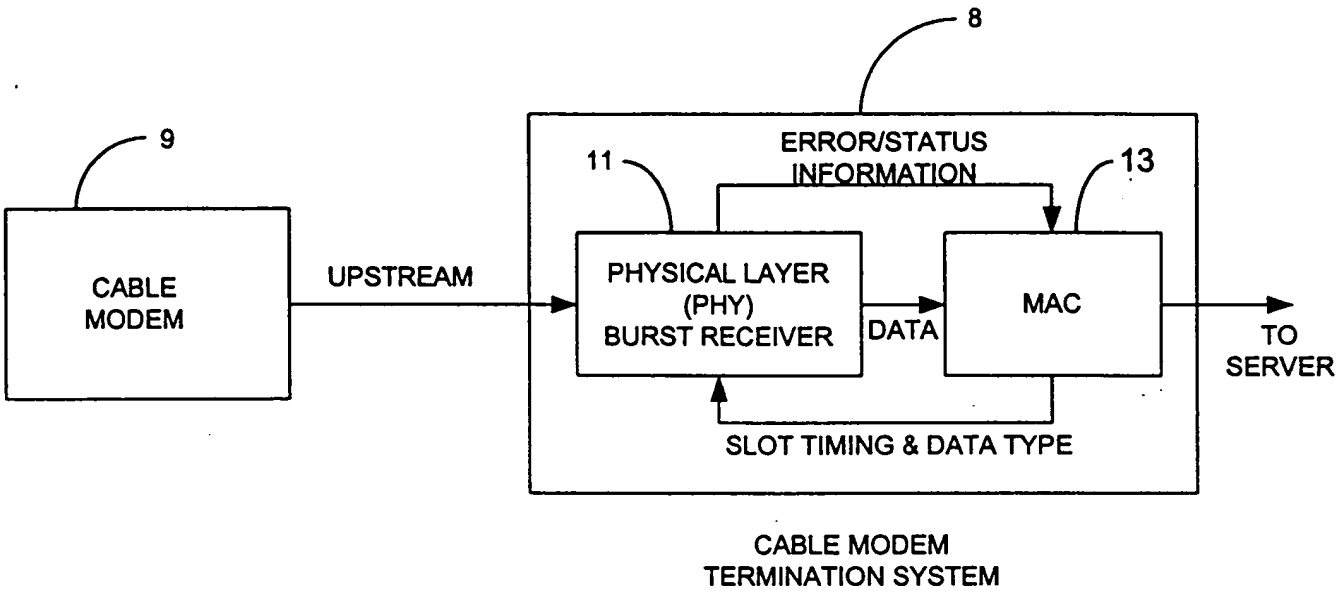


FIG. 1

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

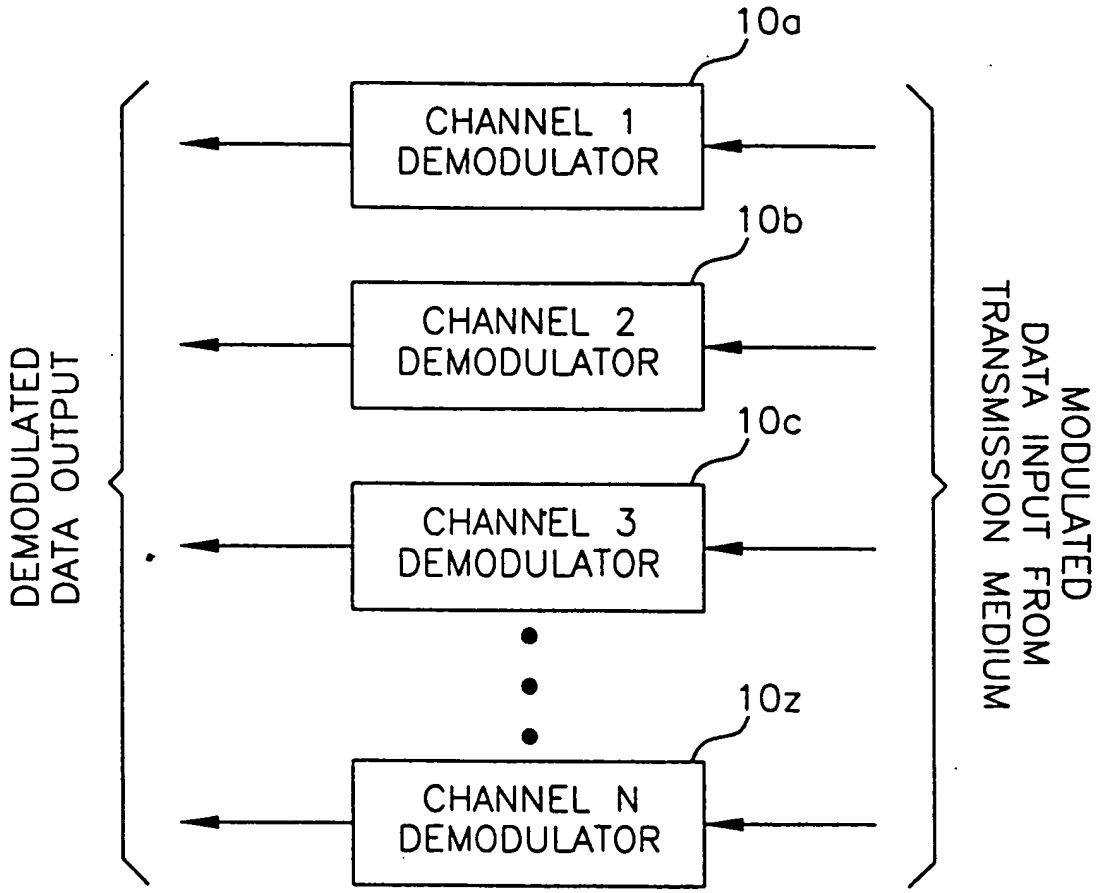


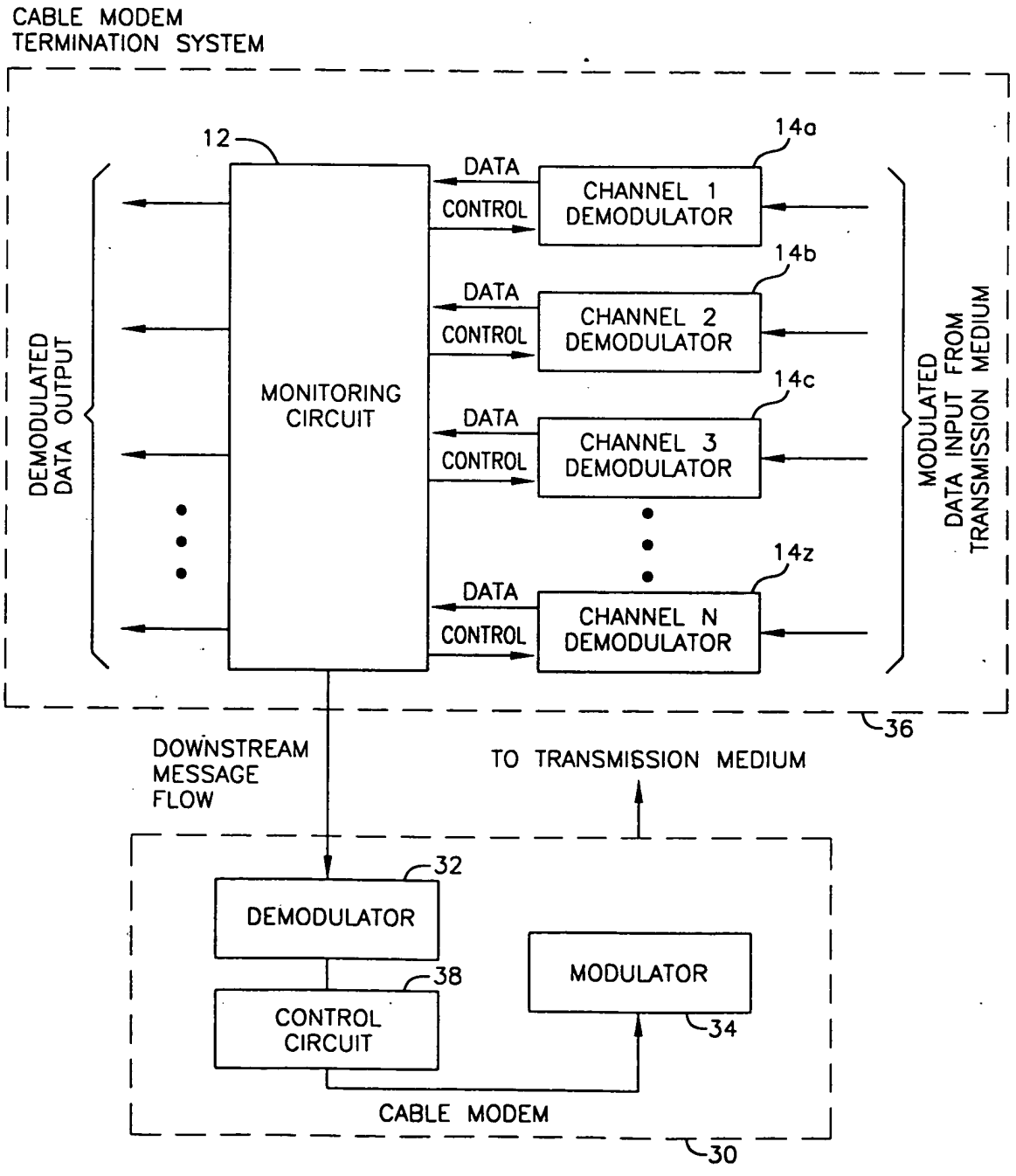
FIG. 2

(Prior Art)

CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

FIG. 3



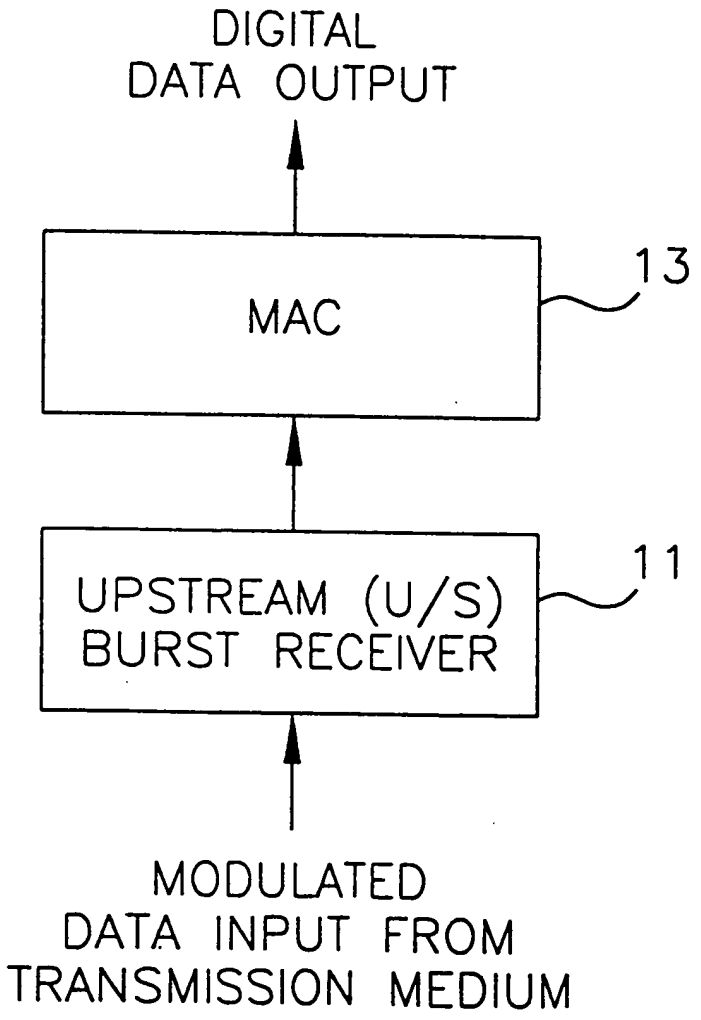


FIG. 4

(Prior Art)

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

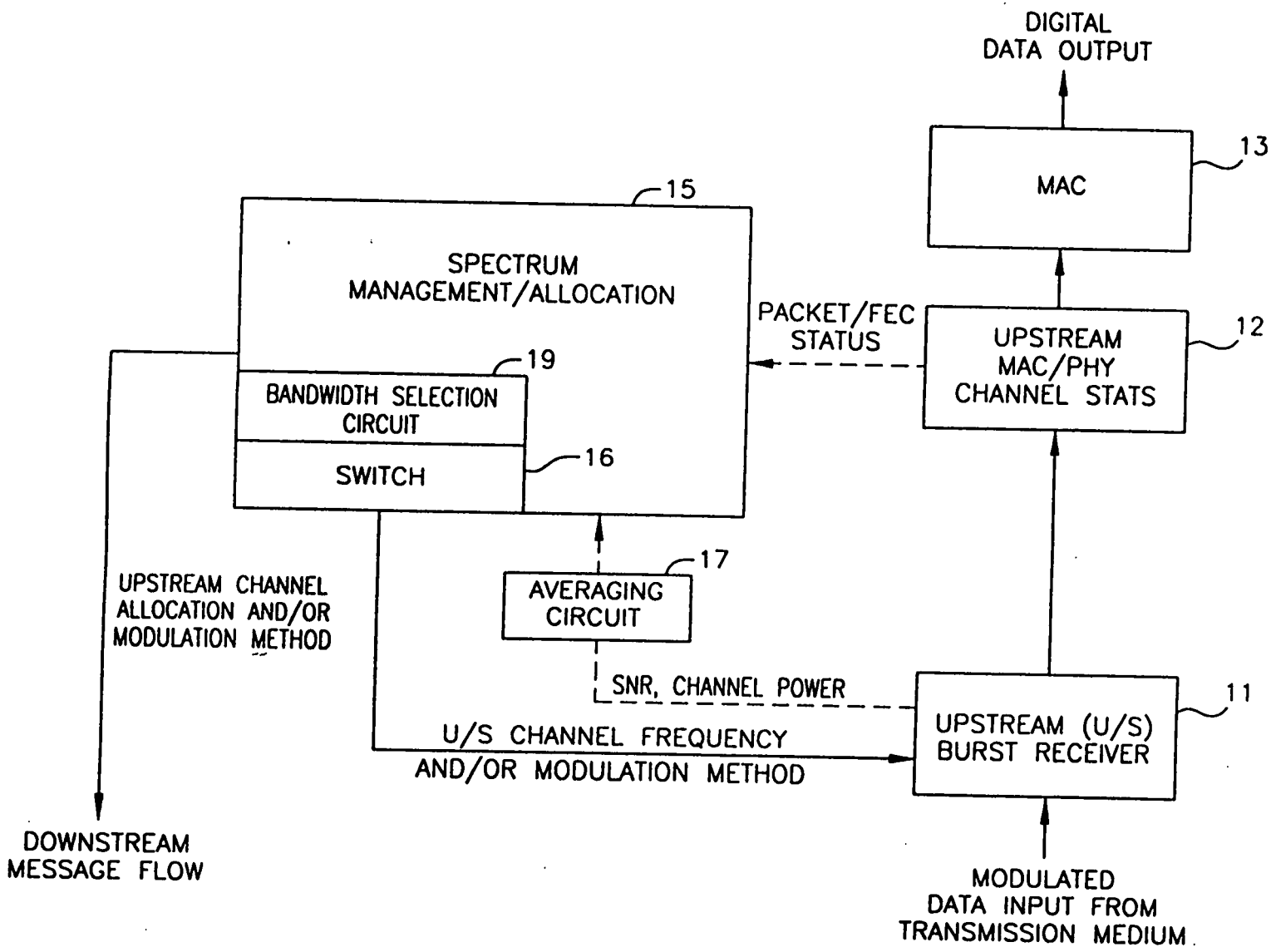


FIG. 5

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

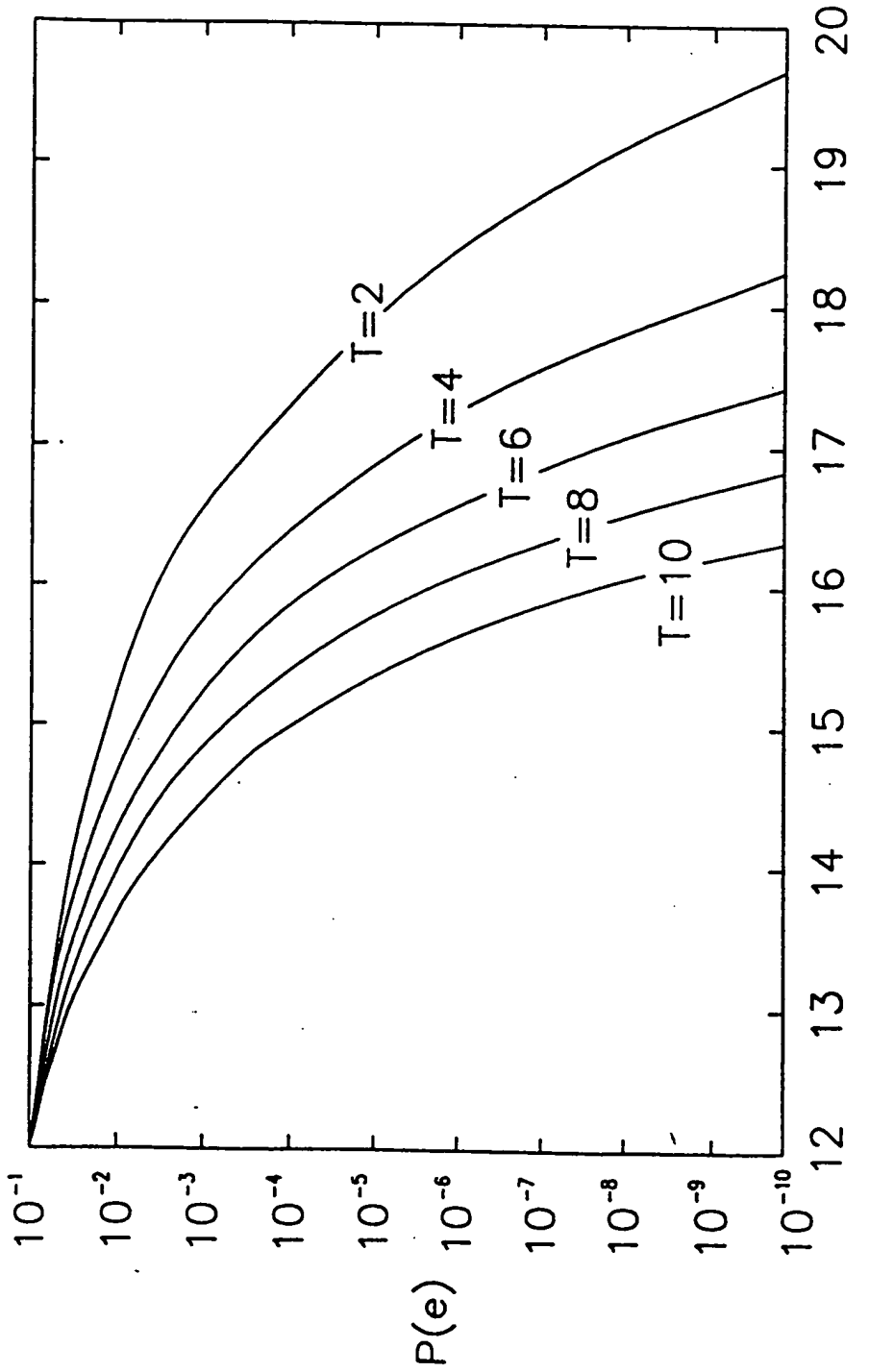


FIG. 6

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

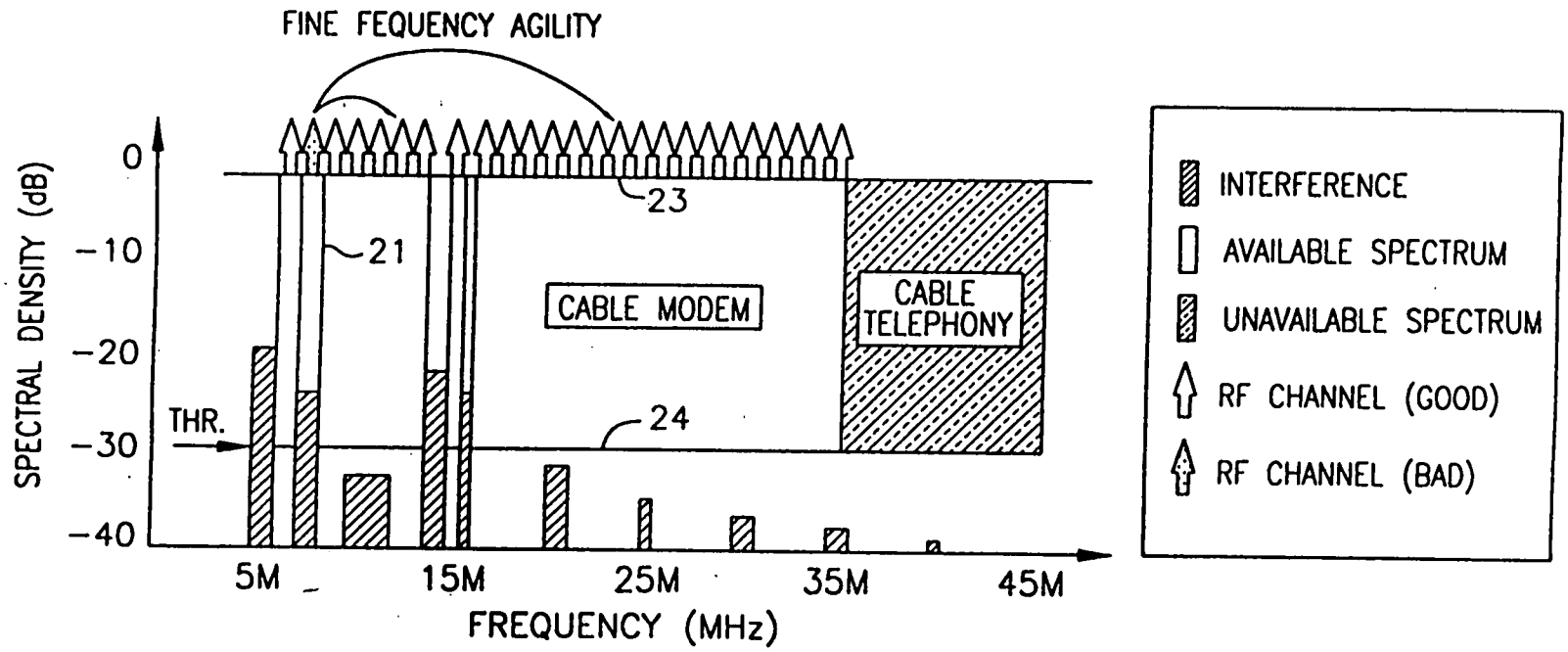


FIG. 7

CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE

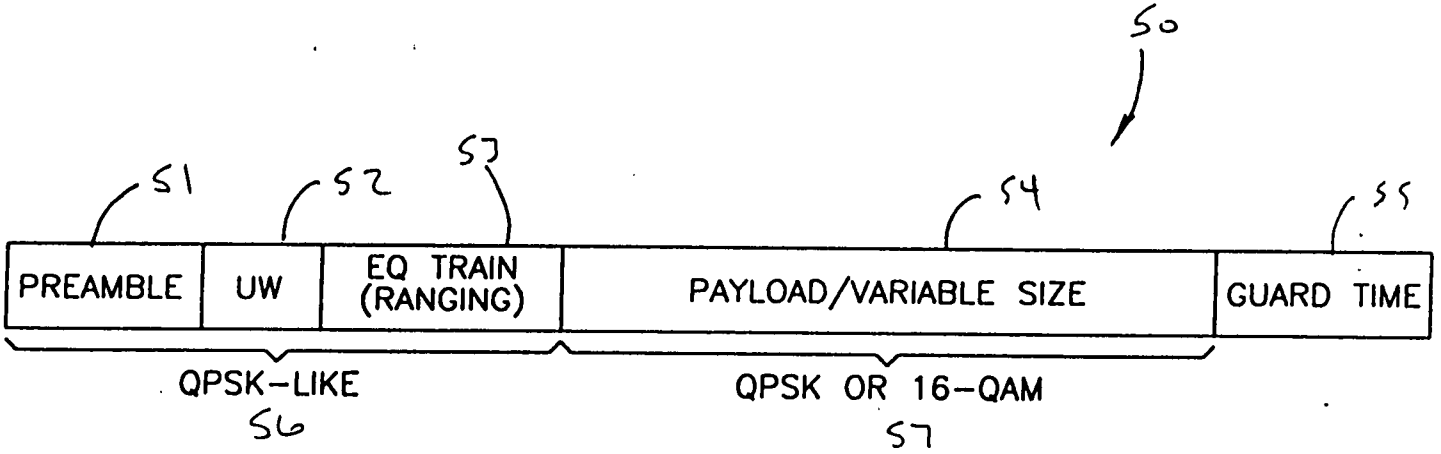
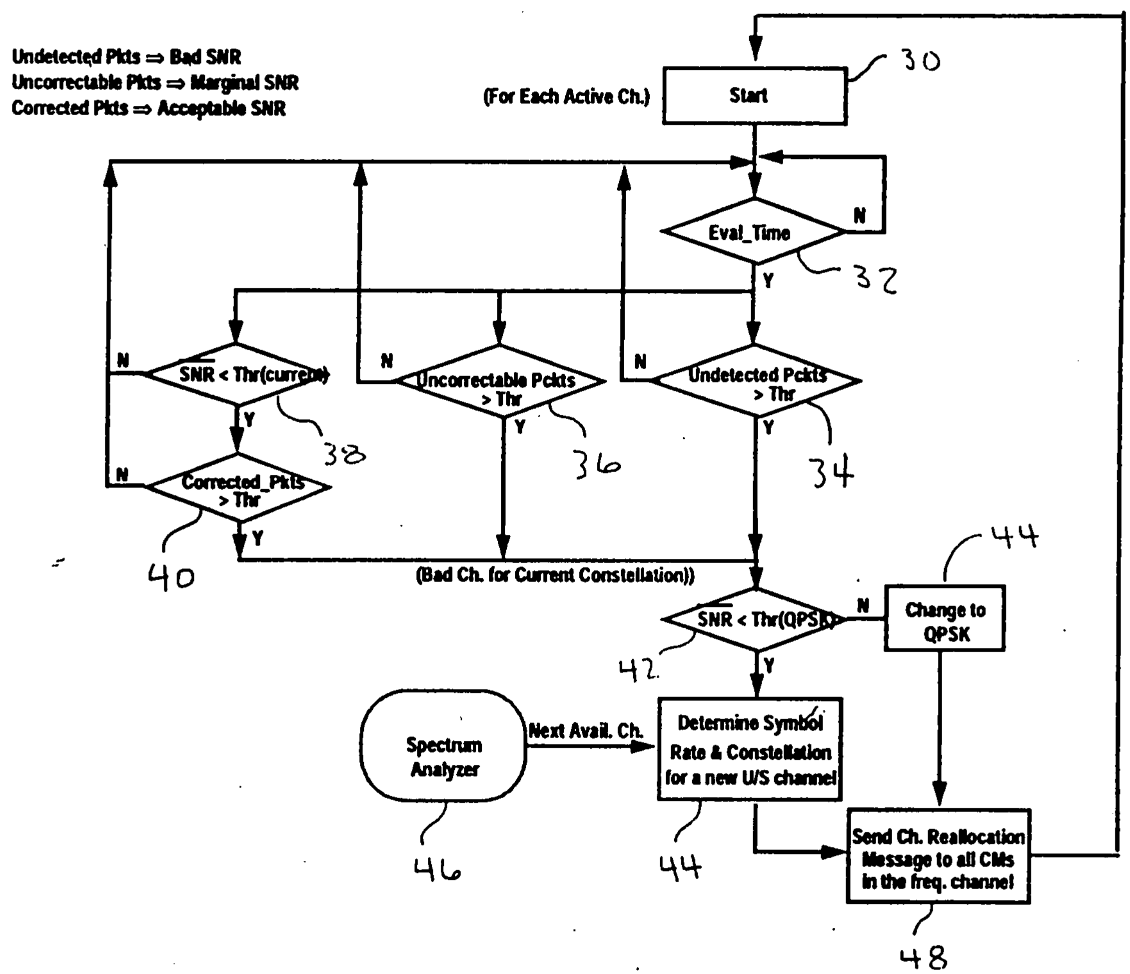


FIG. 7A

CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE

FIG. 8



CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

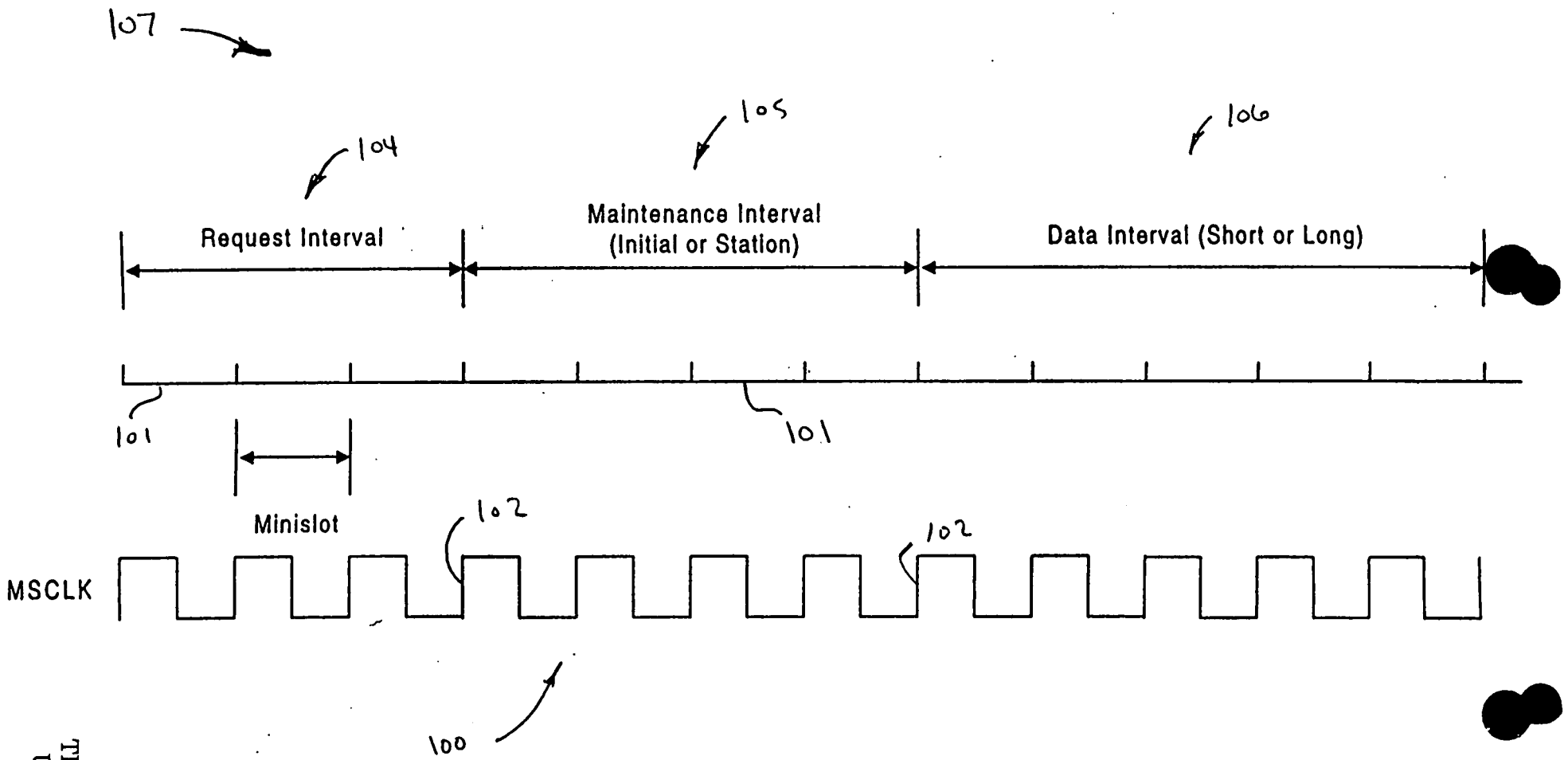


FIG. 9

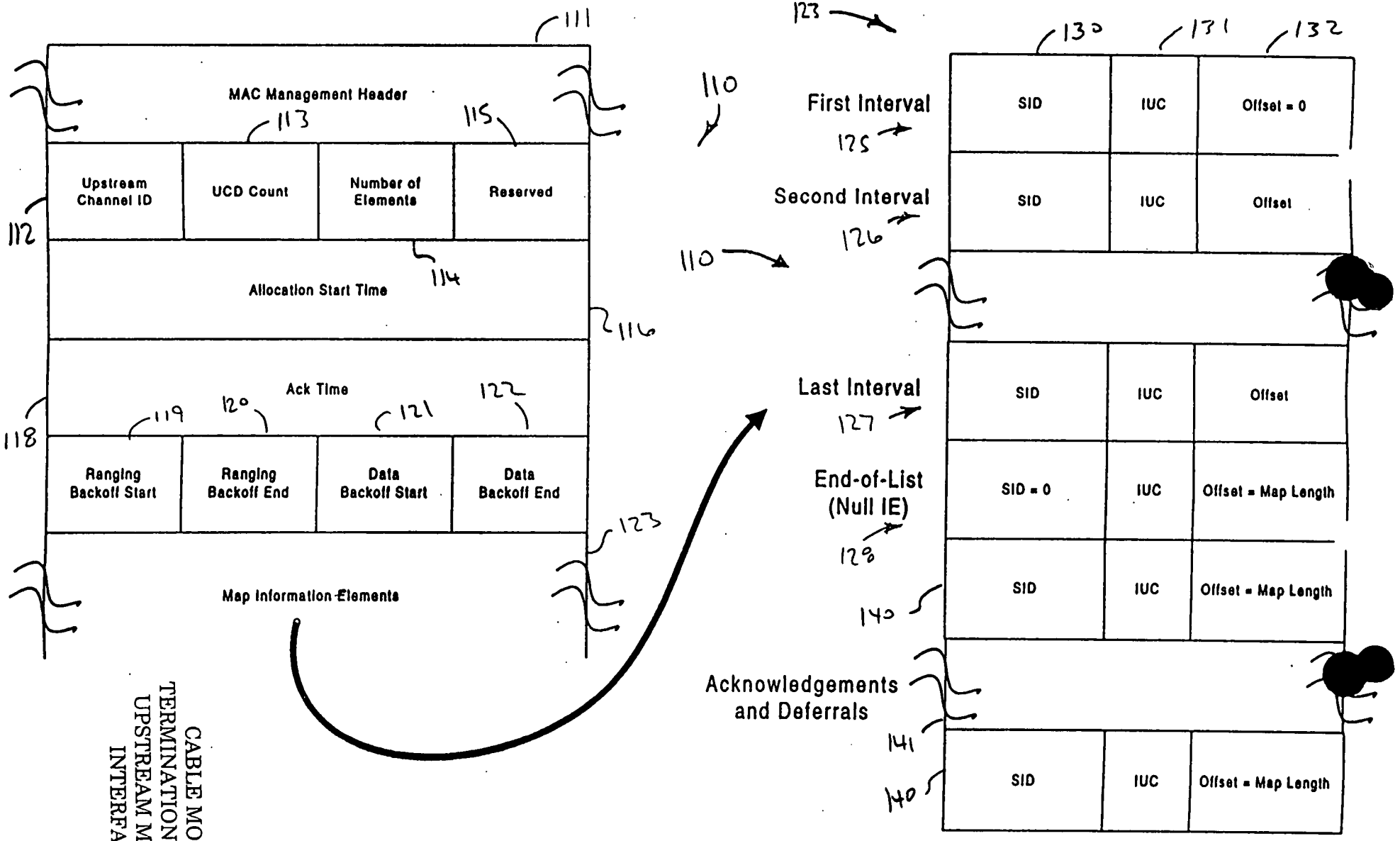

MAC Management Header
Upstream Channel ID
UCD Count
Number of Elements
Reserved
Allocation Start Time
Ack Time
Ranging Backoff Start
Ranging Backoff End
Data Backoff Start
Data Backoff End
Map Information Elements
First Interval
Second Interval
Last Interval
End-of-List (Null IE)
Acknowledgements and Deferrals
SID
IUC
Offset = 0
Offset
Offset = Map Length
SID = 0
CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE

FIG. 10

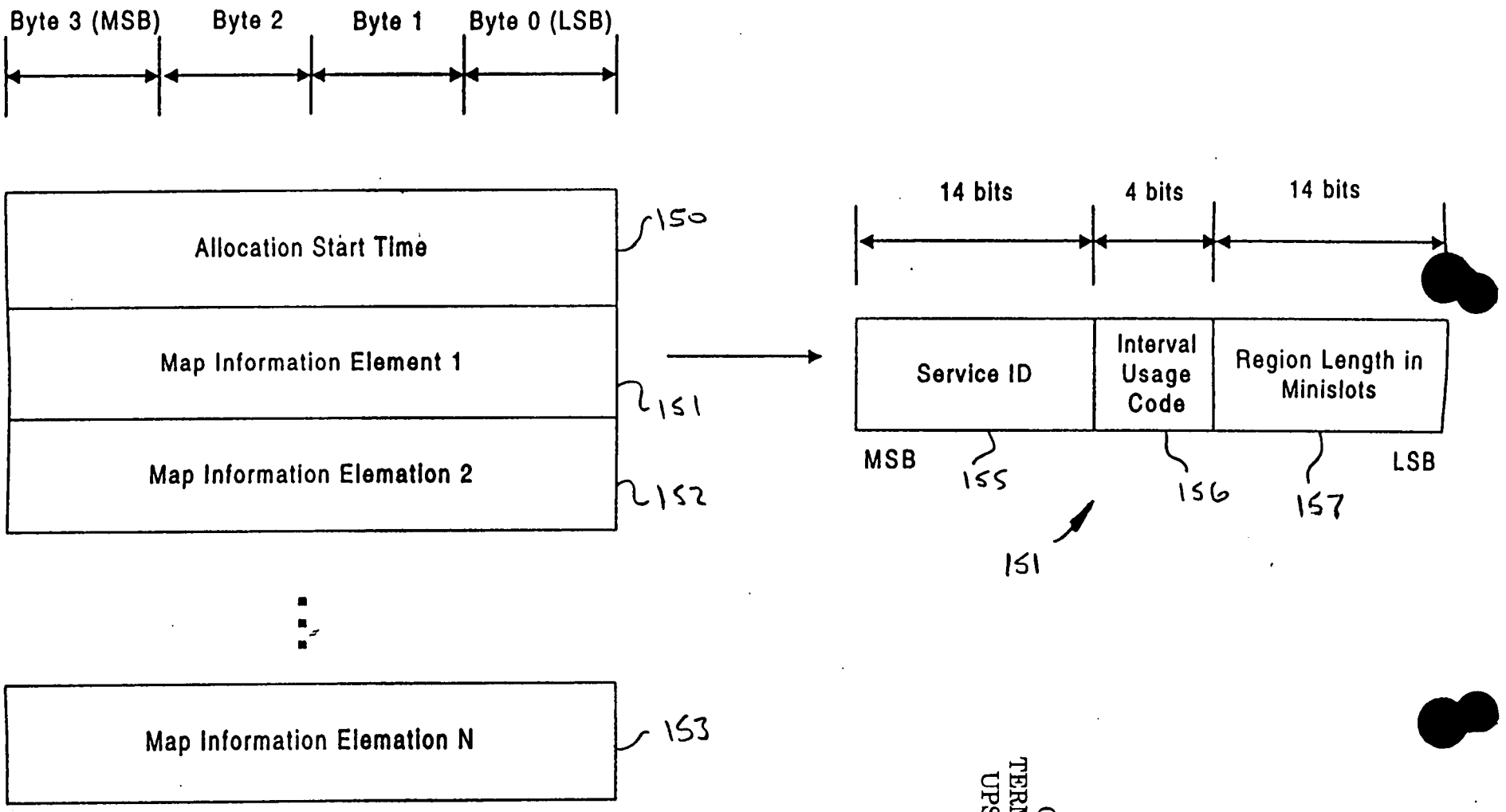


FIG. 11

CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE

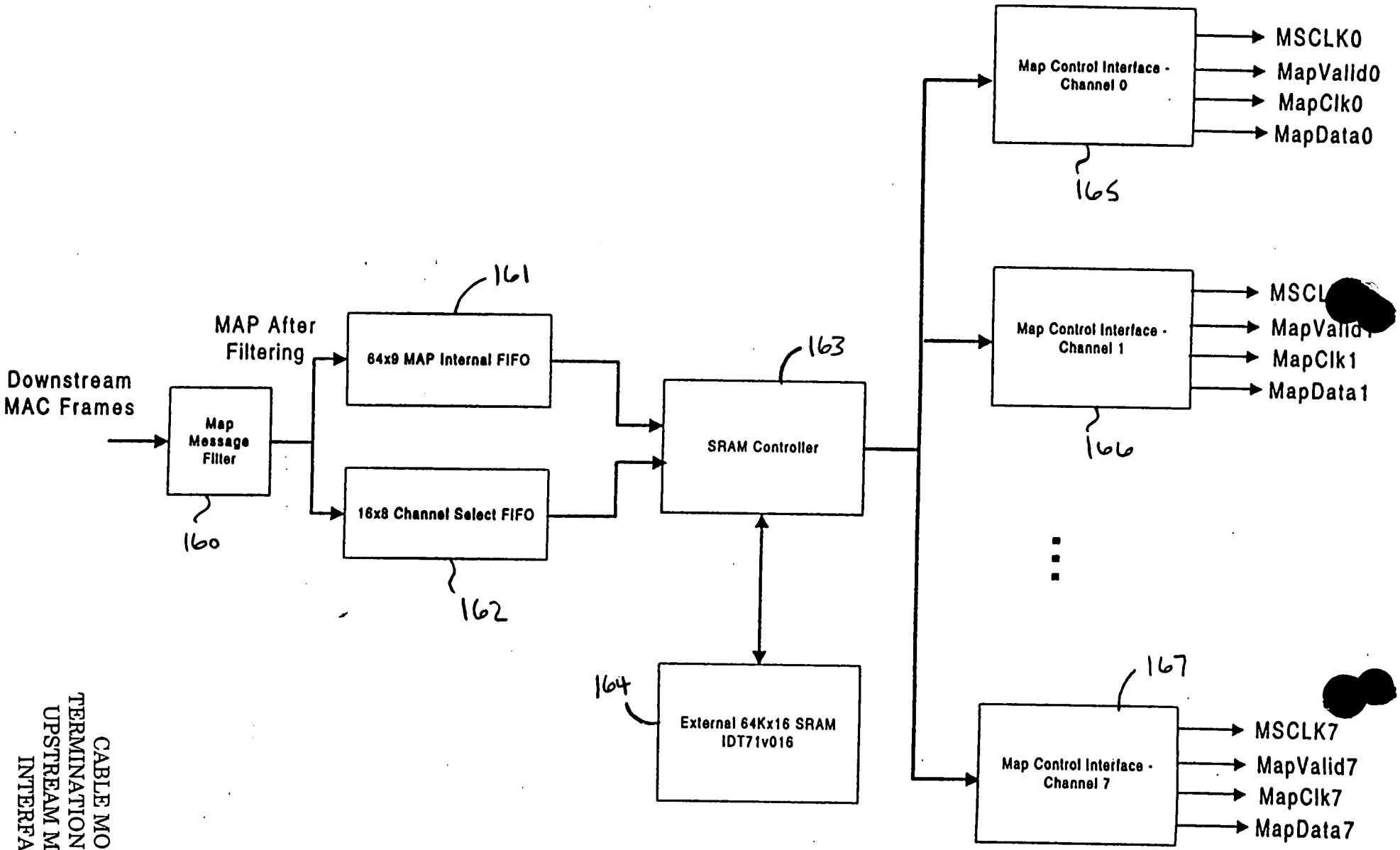

Downstream MAC Frames
Map Message Filter
160
MAP After Filtering
64x9 MAP Internal FIFO
161
16x8 Channel Select FIFO
162
SRAM Controller
163
External 64Kx16 SRAM IDT71v016
164
Map Control Interface - Channel 0
165
MSCLK0
MapValid0
MapClk0
MapData0
Map Control Interface - Channel 1
166
MapClk1
MapData1
Map Control Interface - Channel 7
167
MSCLK7
MapValid7
MapClk7
MapData7
CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE

FIG. 12

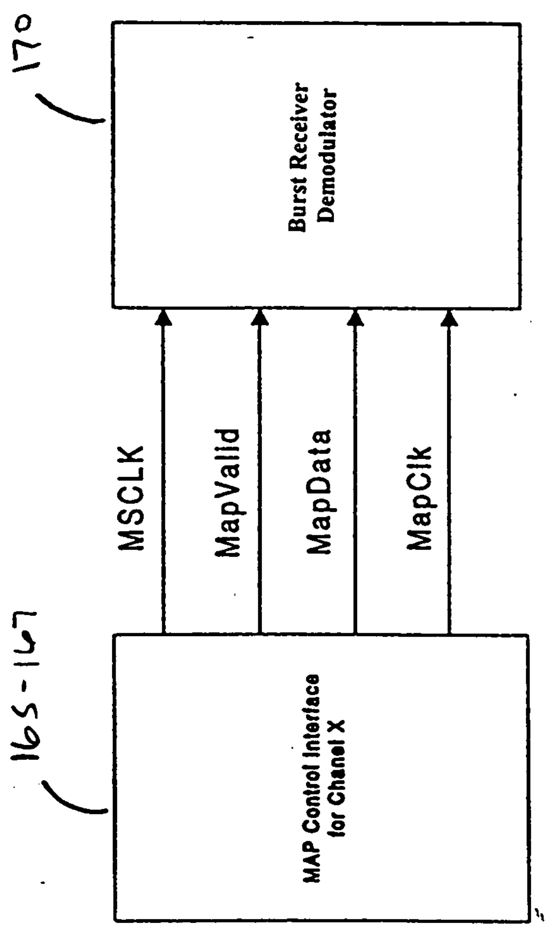


FIG. 13

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

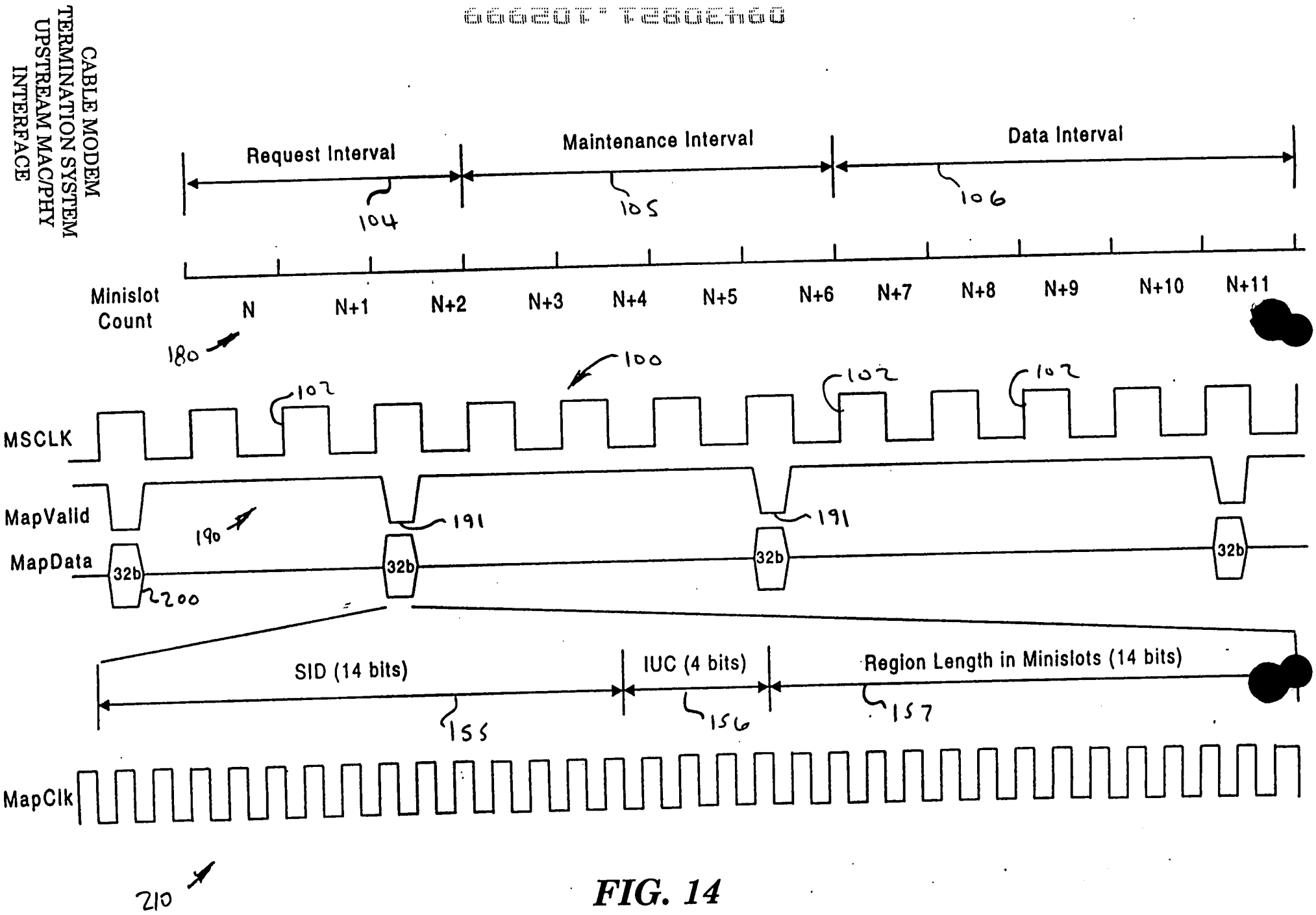

CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE
Request Interval
Maintenance Interval
Data Interval
104
105
106
Minislot Count
N
N+1
N+2
N+3
N+4
N+5
N+6
N+7
N+8
N+9
N+10
N+11
180
100
102
102
102
MSCLK
MapValid
190
191
191
MapData
32b
32b
32b
32b
200
SID (14 bits)
IUC (4 bits)
Region Length in Minislots (14 bits)
155
156
157
MapClk
210

FIG. 14

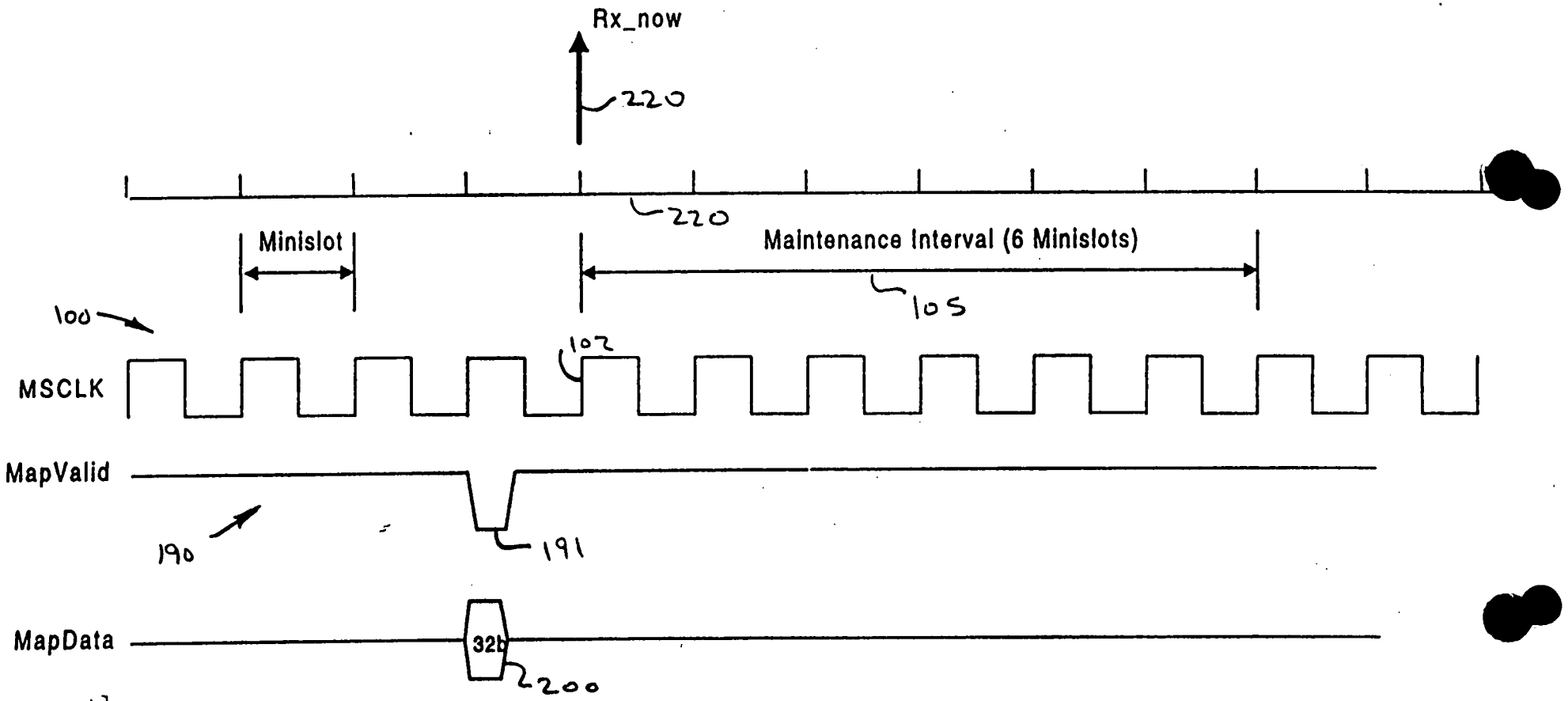

Rx_now
220
220
Minislot
Maintenance Interval (6 Minislots)
105
100
102
MSCLK
MapValid
190
191
MapData
32b
200
CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE

FIG. 15

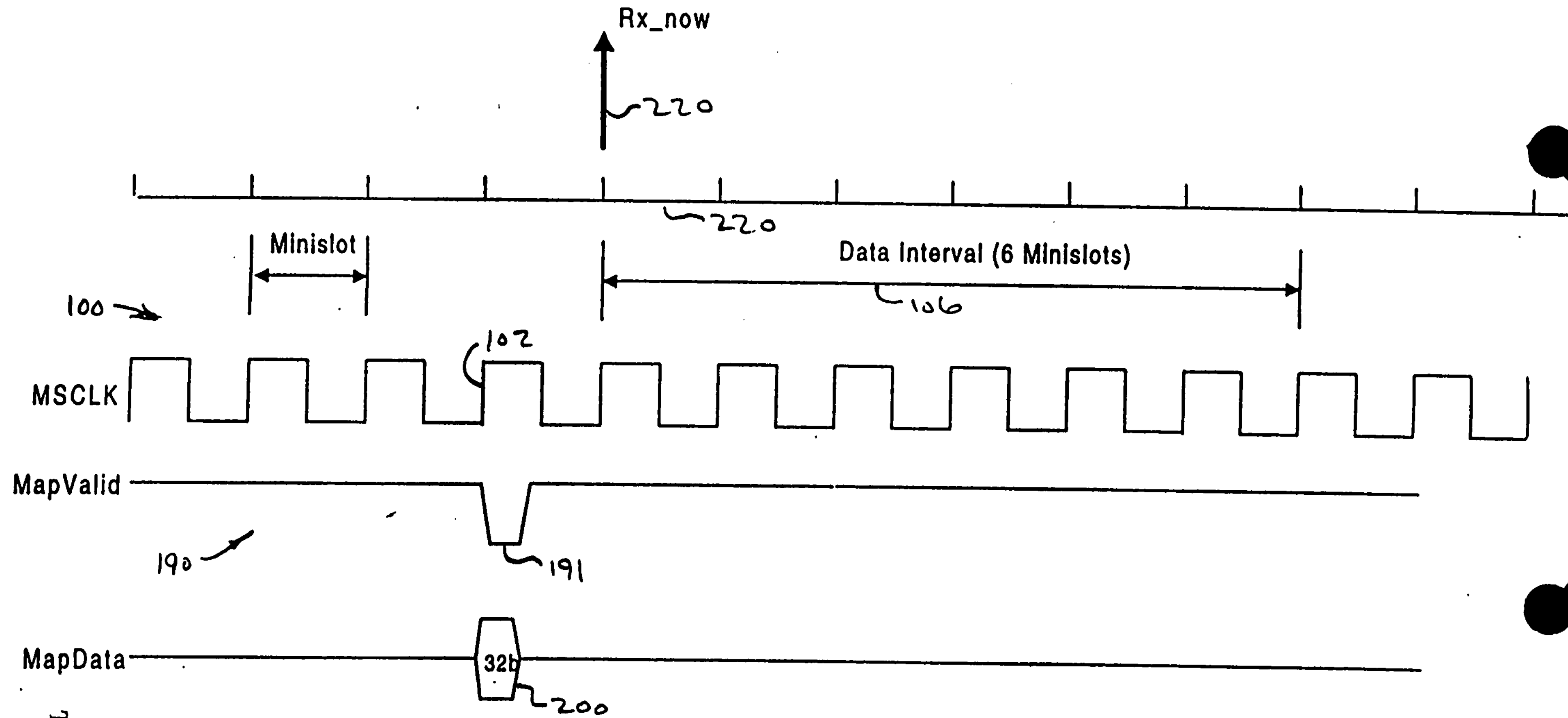
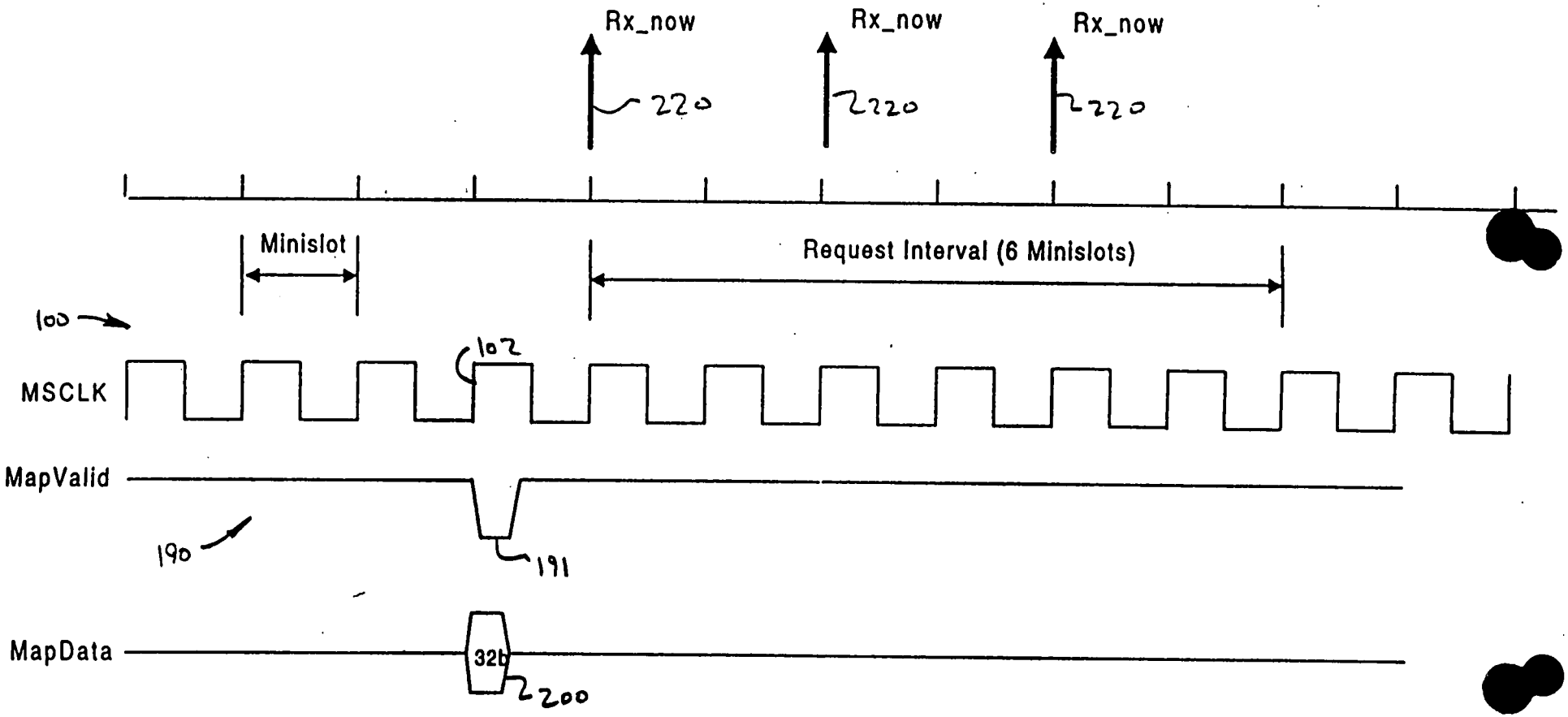


FIG. 16

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE



CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE

* In this example, it is assumed that each request message requires two minislots to transmit

FIG. 17

Rng. Offset 7 bytes

Status 2 bytes	Timestamp 4 bytes	Ch. ID 1 byte	SID 2 bytes	Pwr. 2 bytes	Freq. 2 bytes	Time 3 bytes

FIG. 18

Rng. Offset 7 bytes

Status 2 bytes	Timestamp 4 bytes	Ch. ID 1 byte	SID 2 bytes	Pwr. 2 bytes	Freq. 2 bytes	Time 3 bytes	Equalizer Coeffs. 32 bytes

FIG. 19

Based on the Status bytes [7:5] bits, the following statistics are kept using counters.

Slot Definition	Statistics	Calculation
Data	1. Number of slots	
	2. Number of Slots with power but no data	No UW
	3. Number of slots with bad data	UW and (Bad FEC or Bad HEC)
	4. Number of Good data-slots	UW and Good HEC
	5. Total number of FEC Blocks	
	6. Number of FEC blocks with correctable errors.	
	7. Number of uncorrectable FEC blocks	
Request (Contention)	1. Number of requests received	
	2. Number of collided requests	No UW
	3. Number of corrupted requests	No UW or Bad FEC or Bad HEC
Request/Data (Contention)	1. Number of packets received	
	2. Number of collided packets	No UW
	3. Number of corrupted packets	No UW or Bad FEC or Bad HEC
Ranging	1. Number of ranging messages received	
	2. Number of collided ranging messages received	No UW
	3. Number of corrupted ranging messages	No UW or Bad FEC or Bad HEC

FIG. 20

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

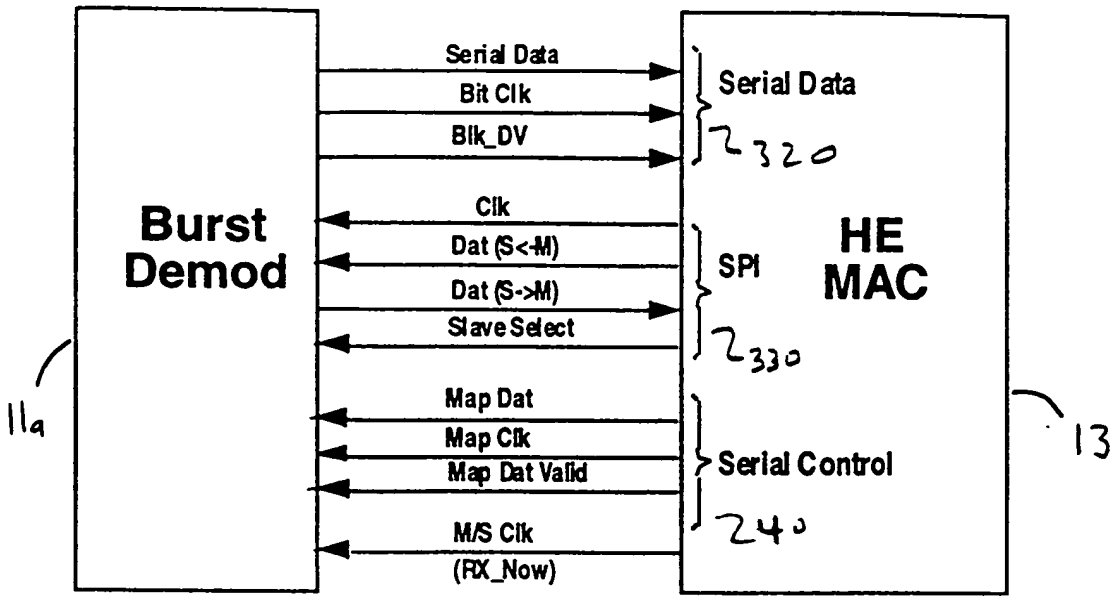


FIG. 21

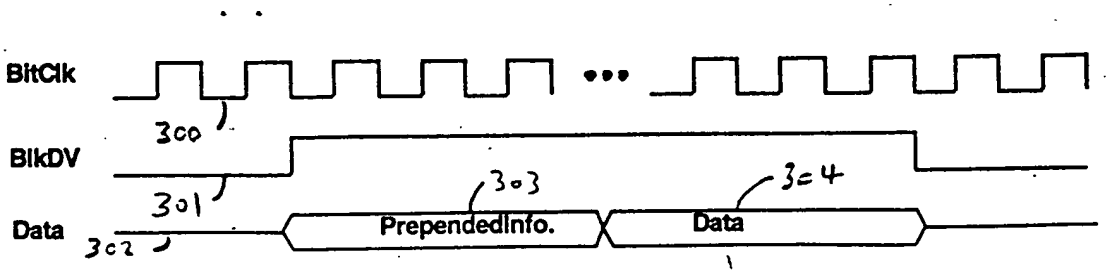


FIG. 22

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

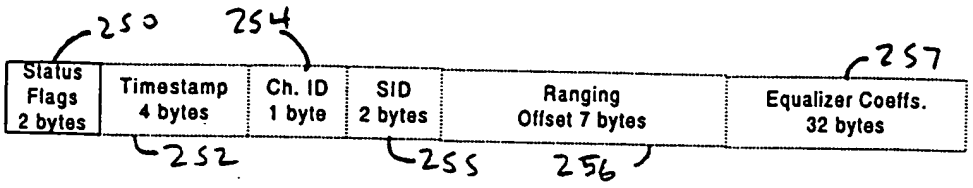


FIG. 23

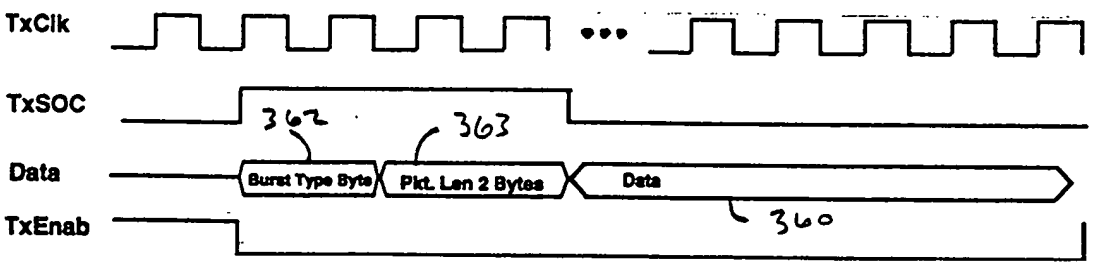
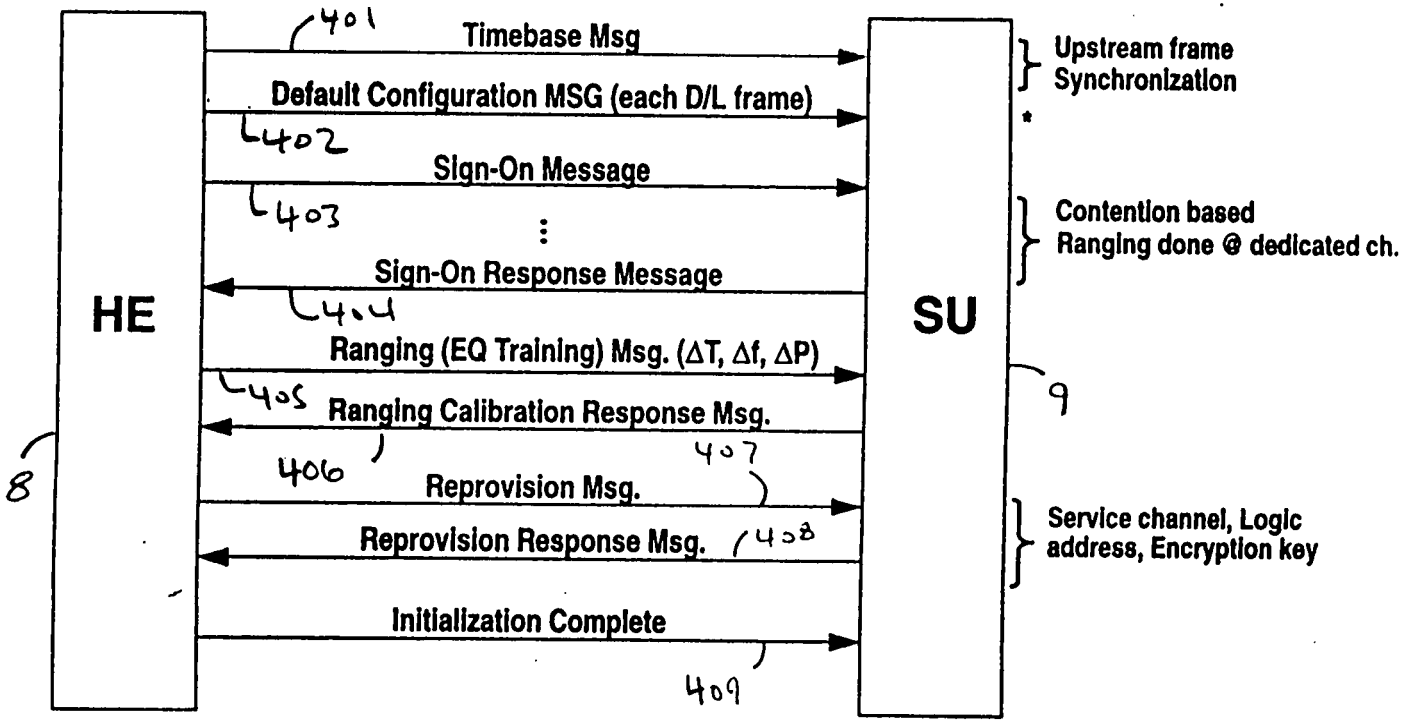


FIG. 24

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

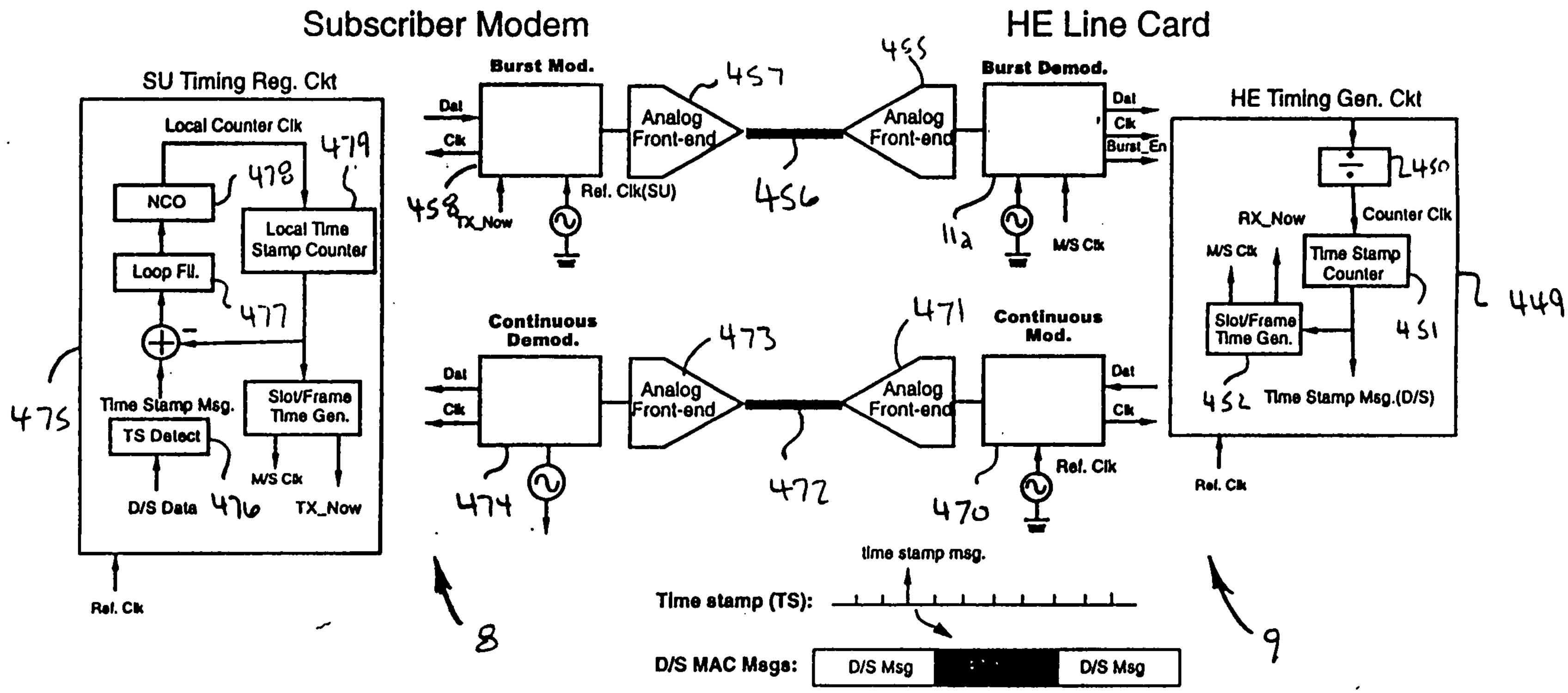
- **Sign-On Sequence** (plug-&-play based registration)



* Default Configuration Msg: Ranging channel frequency, Transmission rate Initial pwr level, Contention-based access slot information, etc.

FIG. 25

CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE



- **MAC framing and PHY framing are decoupled**
- **Upstream frame synchronization based on time stamp messages**

FIG. 26

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

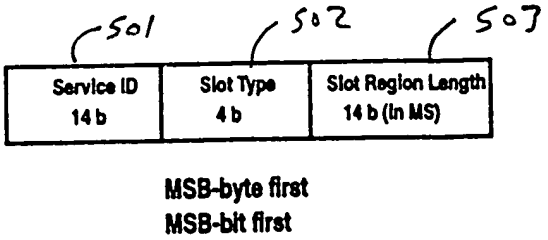


FIG. 27

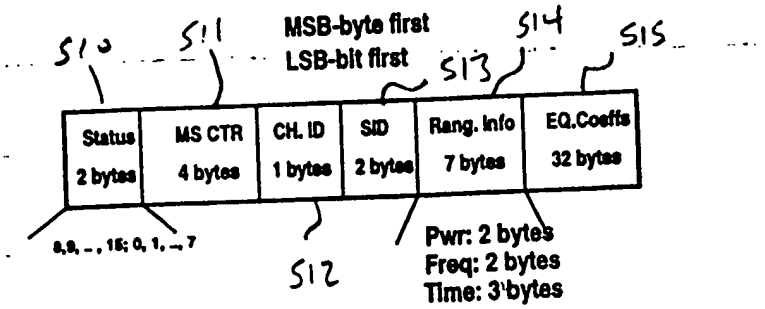


FIG. 28

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

Bit Field	Definition if Bit[11]=1	Definition if Bit[11]=0
Bit[15:12]	MCNS IUC	Reserved
Bit [11]	1: indicates 1st block of transmission	0: indicates not 1st block of transmission
Bit [10]	1: indicates last block of transmission	1: indicates last block of transmission
Bit [9]	1: indicates Ranging required	Reserved
Bit [8]	Reserved	Reserved
Bit [7:5]	000: FEC OK 001: Correctable FEC Error 010: uncorrectable FEC error 011: no Unique word detected 100: collided packet 101: no energy 110: packet length violation	000: FEC OK 001: Correctable FEC Error 010: uncorrectable FEC error 011: no Unique word detected 100: collided packet 101: no energy 110: packet length violation
Bit [4]	1: Valid Minislot count prepended	Reserved
Bit [3]	1: Valid Channel ID prepended	Reserved
Bit [2]	1: Valid SID prepended	Reserved
Bit [1]	1: Ranging Info prepended	Reserved
Bit [0]	1: Equalizer coefficients prepended	Reserved

FIG. 29

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

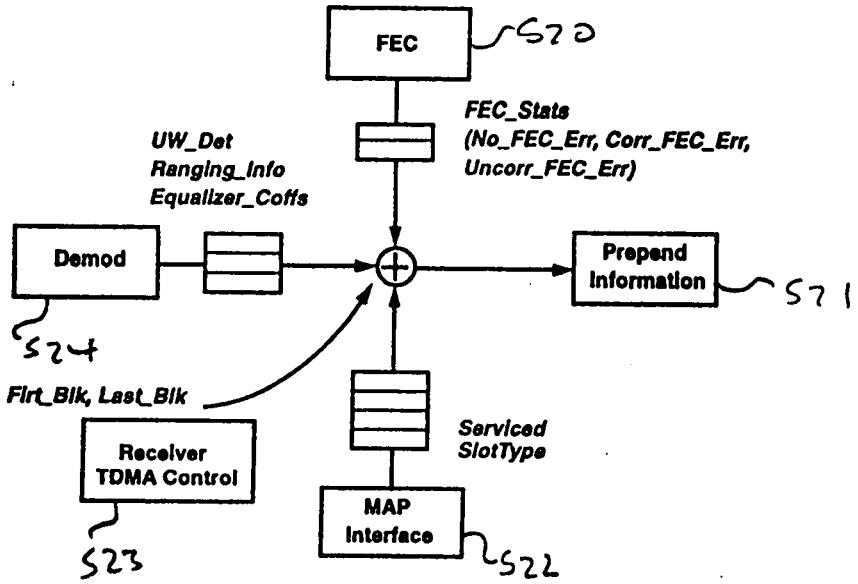


FIG. 30

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

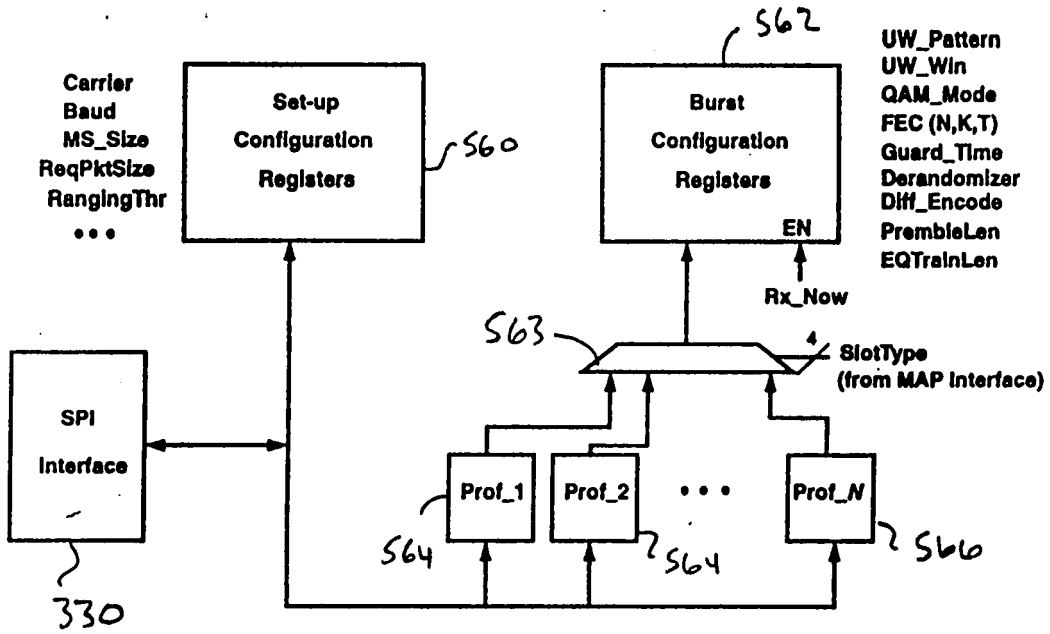


FIG. 31

CABLE MODEM
TERMINATION SYSTEM
UPSTREAM MAC/PHY
INTERFACE

FIG.32

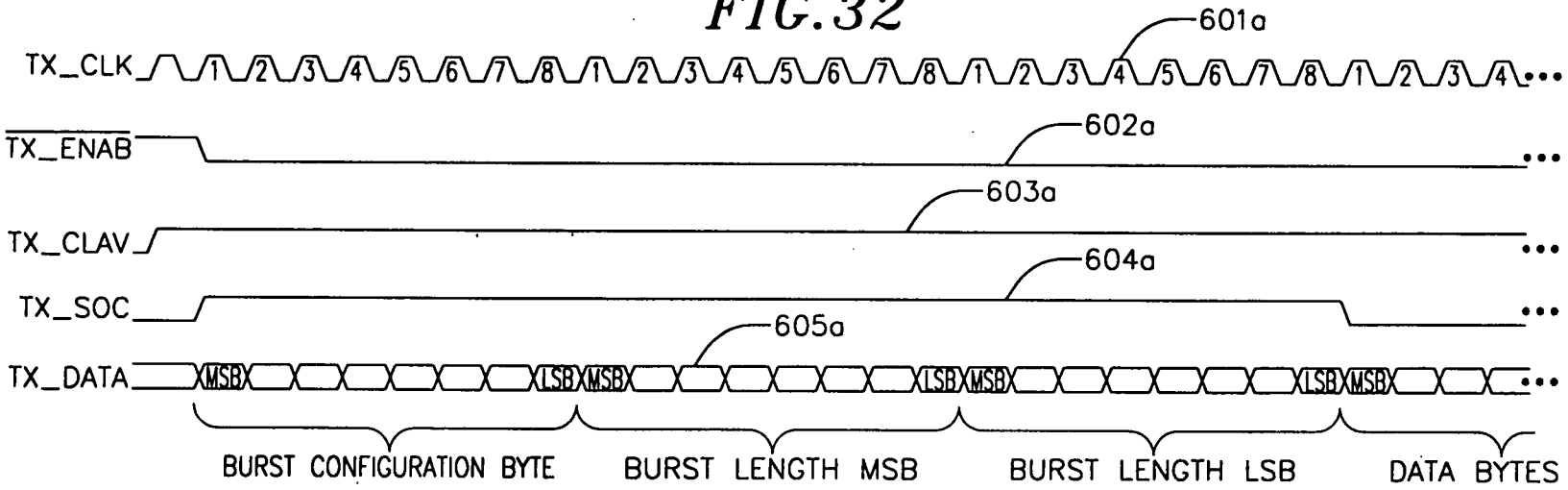
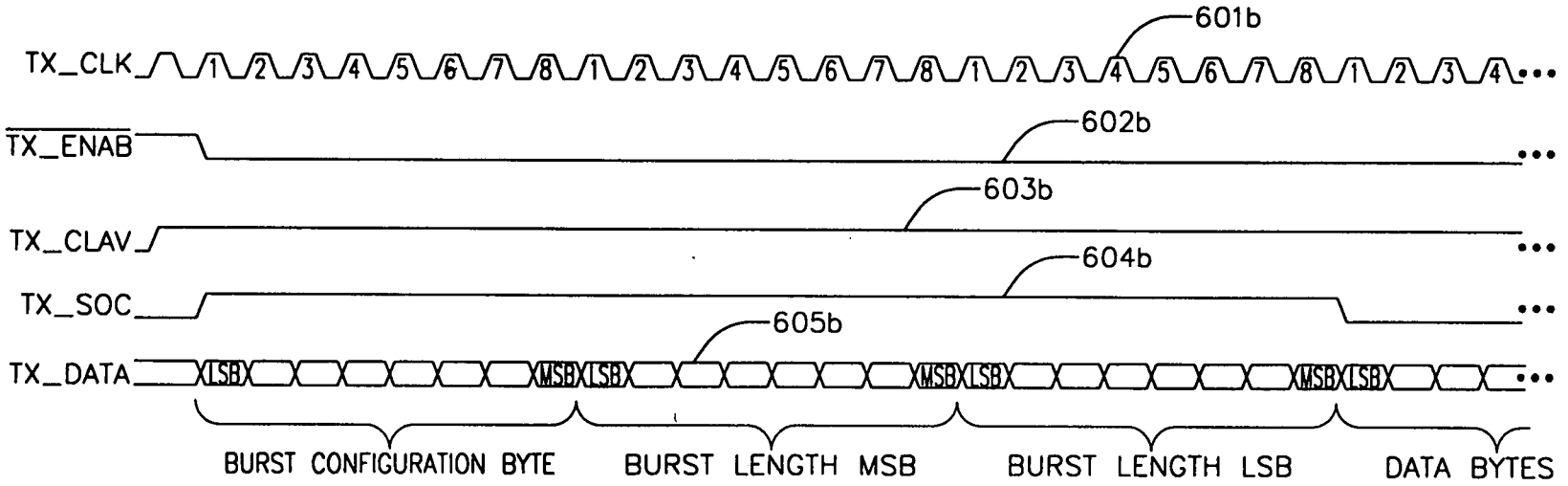
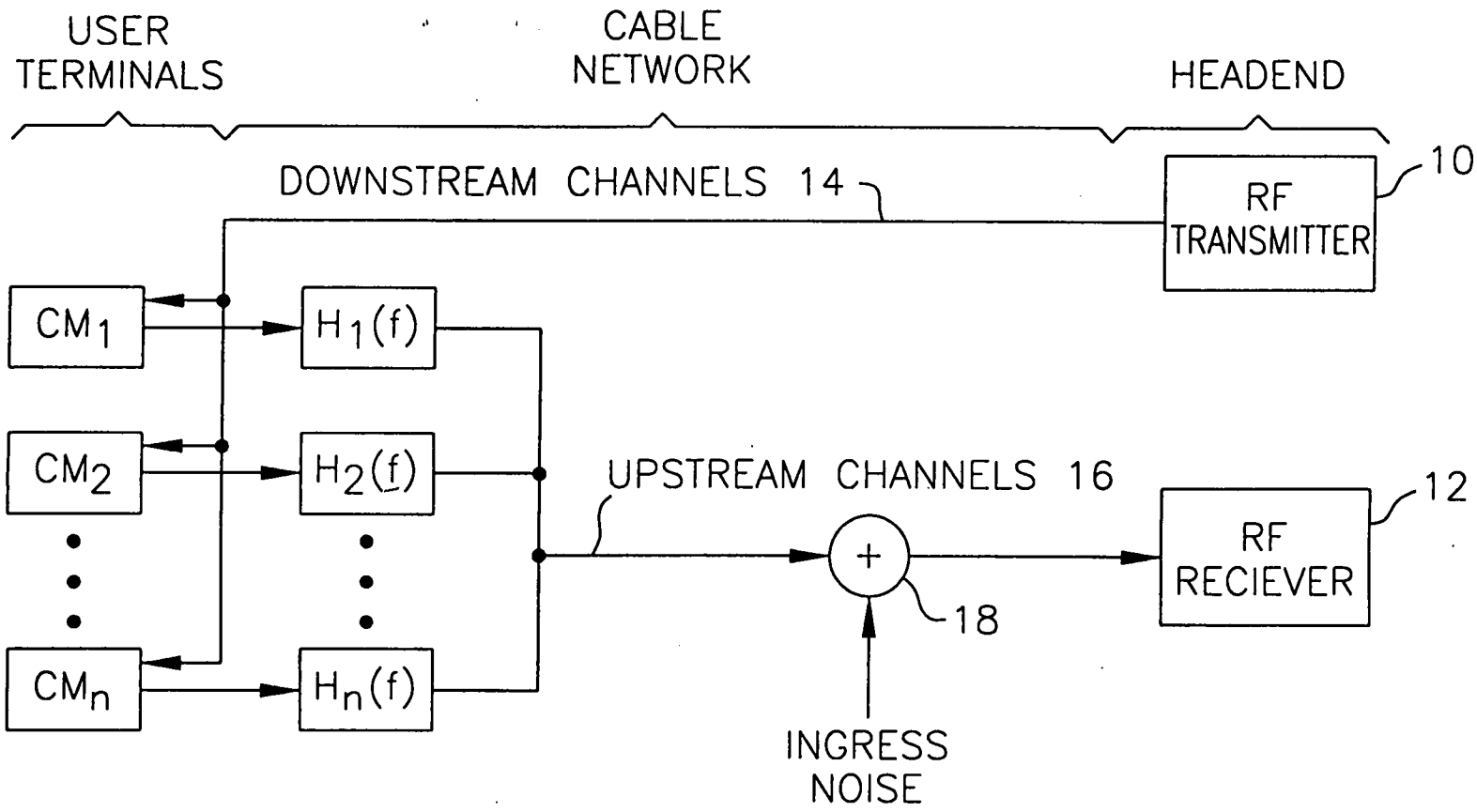


FIG.33



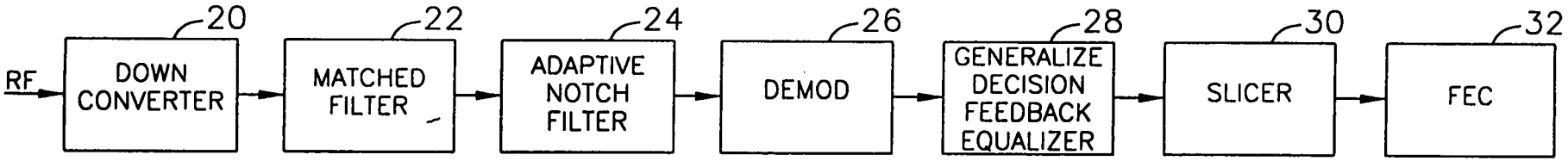
CABLE MODEM TERMINATION SYSTEM UPSTREAM MAC/PHY INTERFACE

FIG. 1



METHOD AND APPARATUS FOR REDUCING NOISE IN A BIDIRECTIONAL CABLE TRANSMISSION SYSTEM

FIG.2



METHOD AND APPARATUS FOR REDUCING NOISE IN A BIDIRECTIONAL CABLE TRANSMISSION SYSTEM

FIG.3

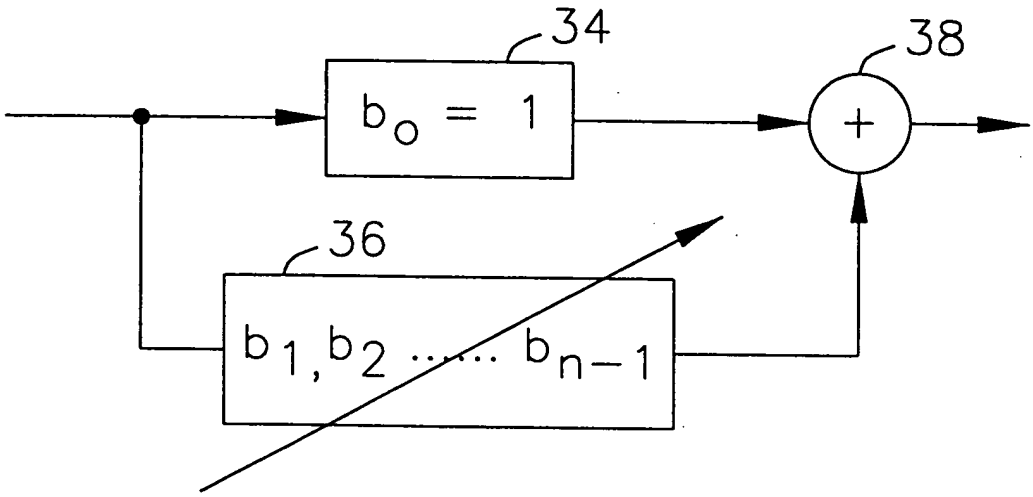
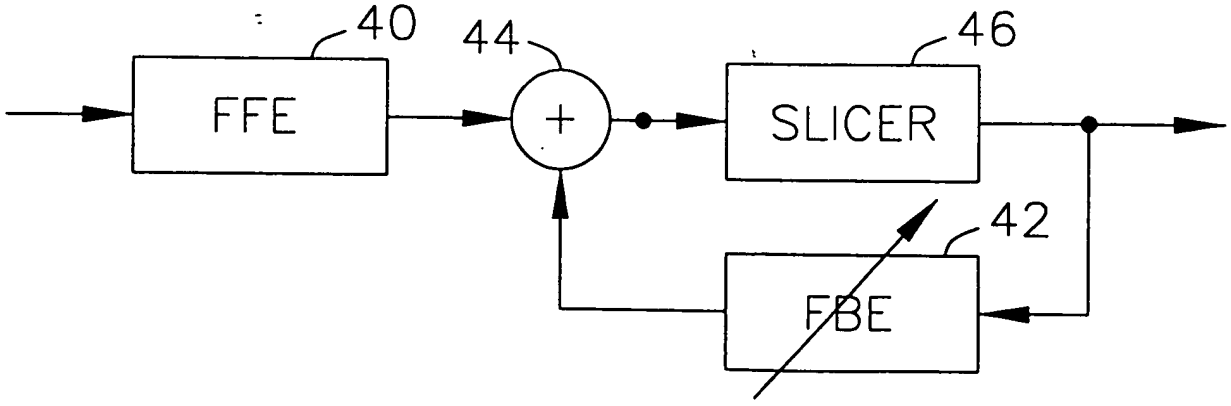
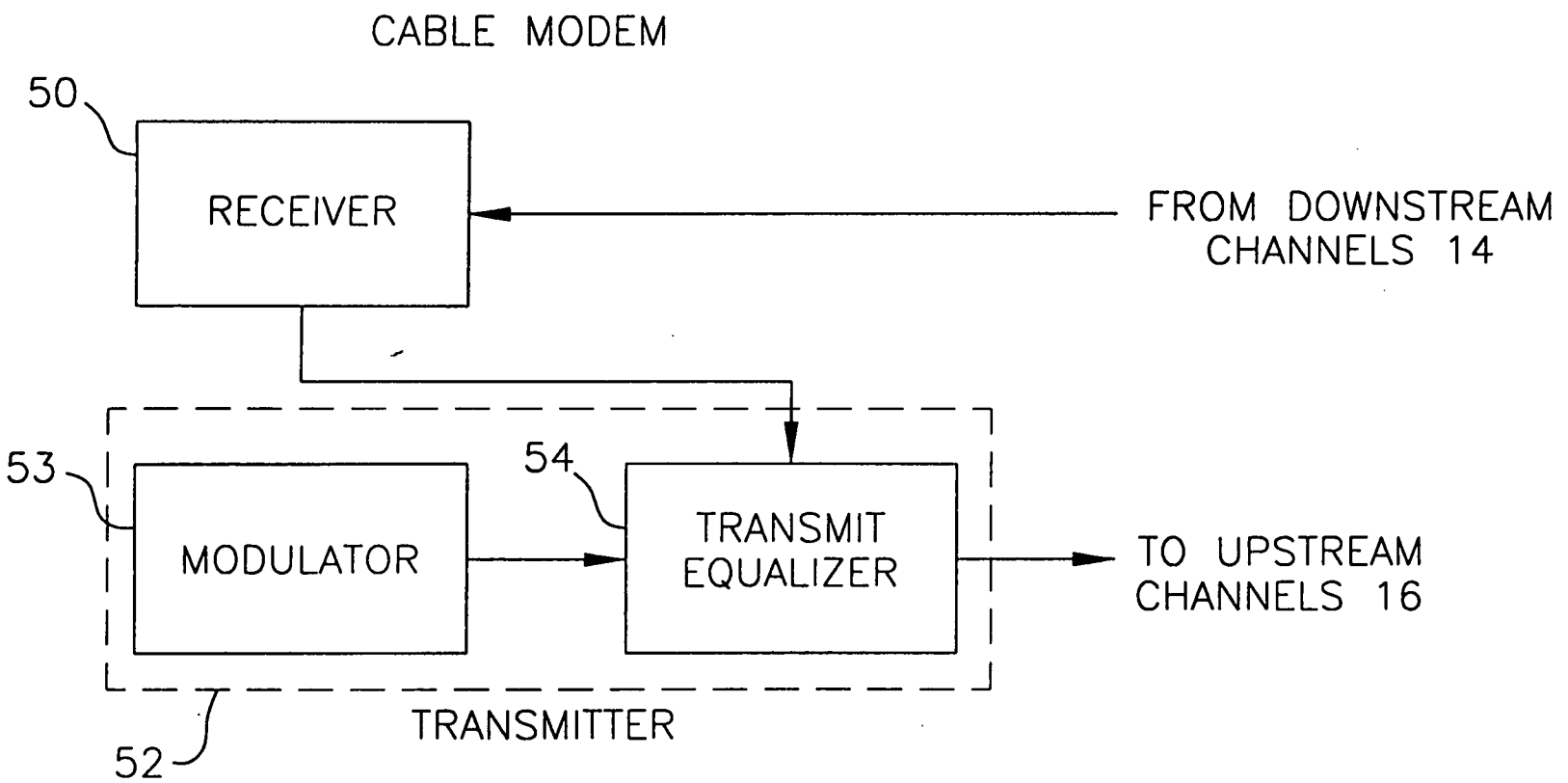


FIG.4



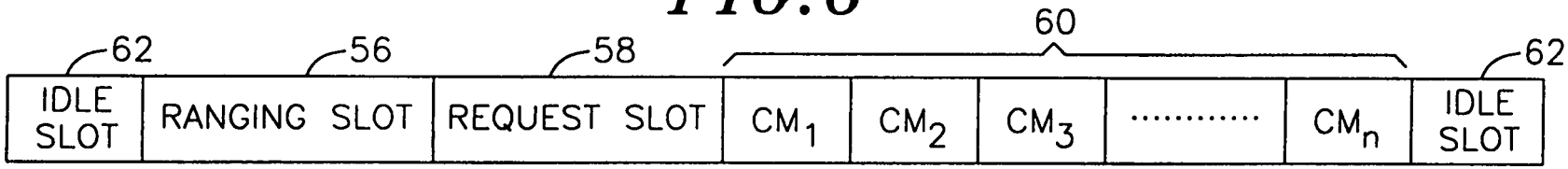
METHOD AND APPARATUS FOR REDUCING NOISE IN A BIDIRECTIONAL CABLE TRANSMISSION SYSTEM

FIG.5



METHOD AND APPARATUS FOR REDUCING NOISE IN A BIDIRECTIONAL CABLE TRANSMISSION SYSTEM

FIG. 6



METHOD AND APPARATUS FOR REDUCING NOISE IN A BIDIRECTIONAL CABLE TRANSMISSION SYSTEM

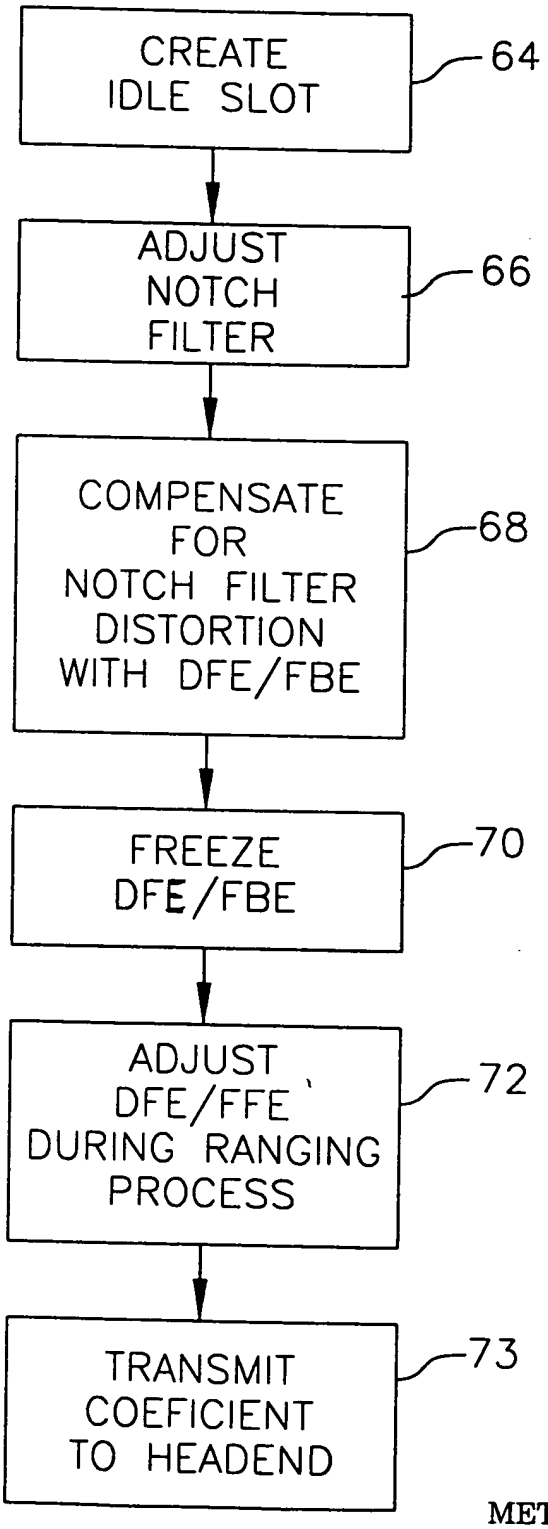


FIG. 7

METHOD AND APPARATUS FOR REDUCING NOISE IN A BIDIRECTIONAL CABLE TRANSMISSION SYSTEM

FIG. 8A

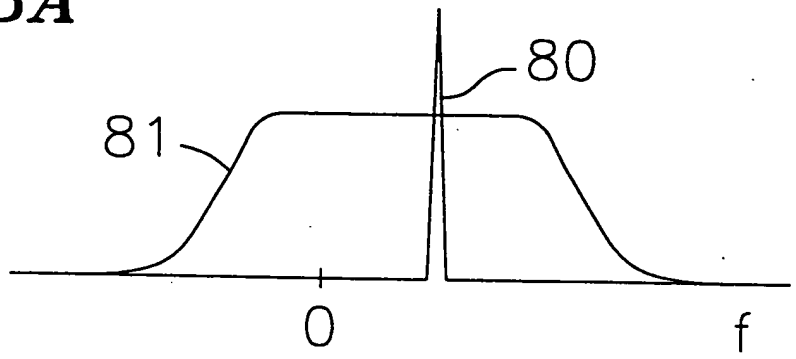


FIG. 8B

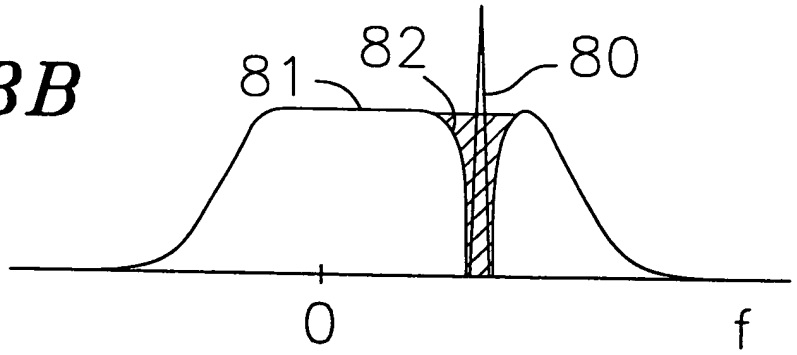
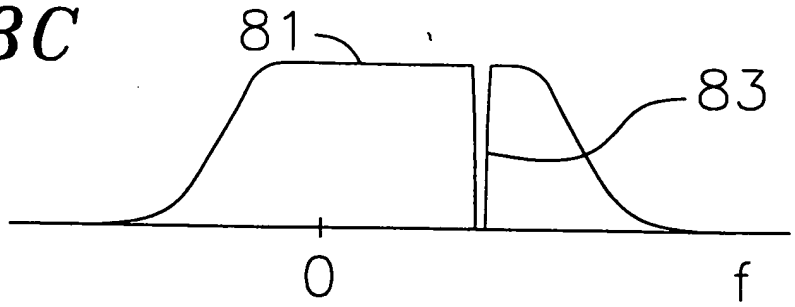


FIG. 8C



METHOD AND APPARATUS FOR REDUCING NOISE IN A BIDIRECTIONAL CABLE TRANSMISSION SYSTEM

16-QAM Constellation
BEFORE NOISE REJECTION

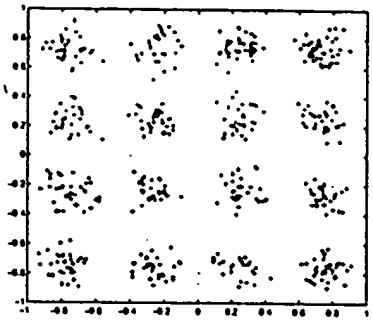


Fig. 9A

16-QAM Constellation
AFTER NOISE REJECTION

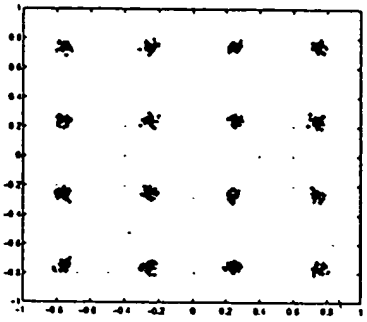


Fig. 9B

METHOD AND APPARATUS
FOR REDUCING NOISE IN A
BIDIRECTIONAL CABLE
TRANSMISSION SYSTEM

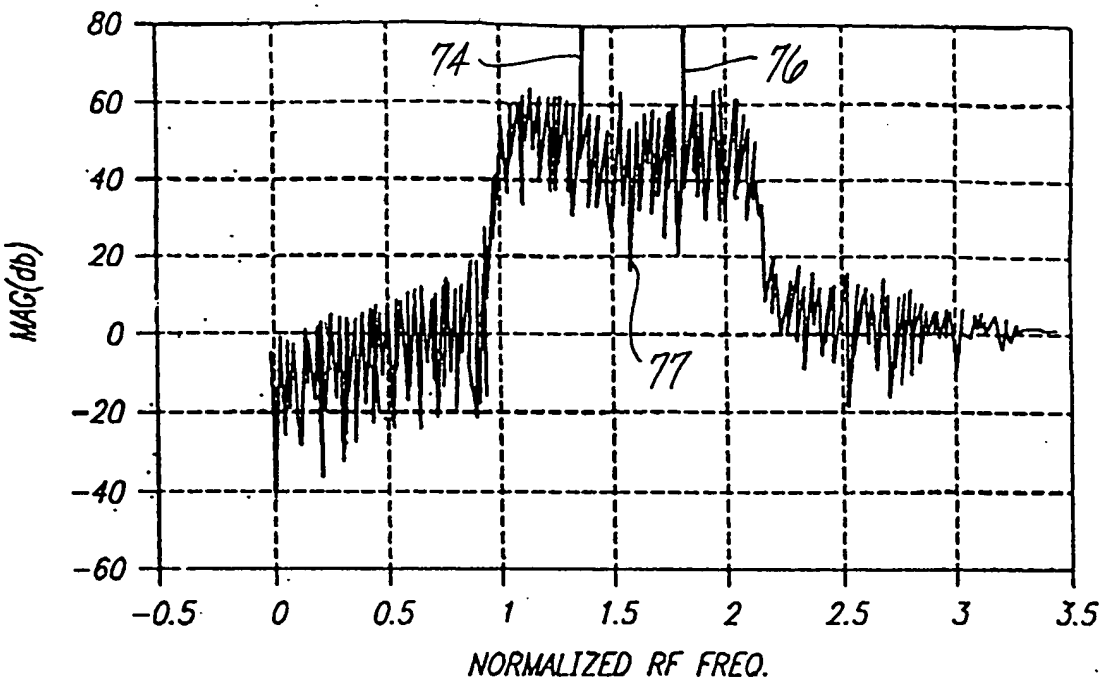


Fig. 10A

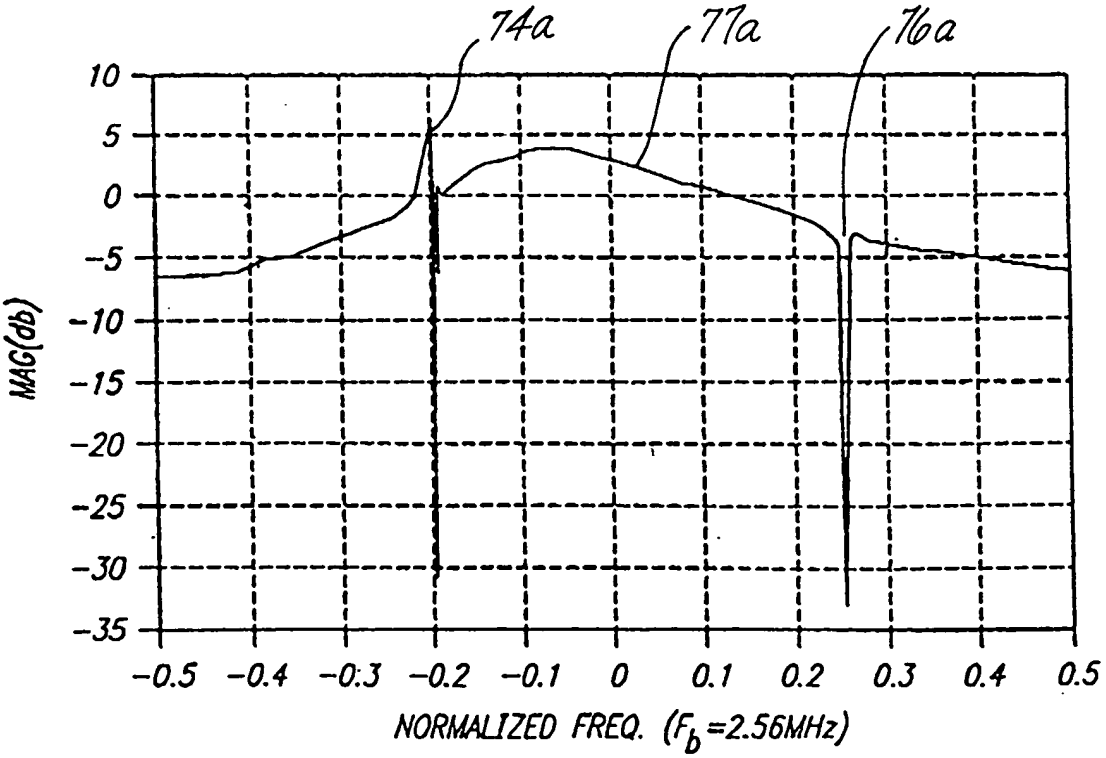


Fig. 10B

METHOD AND APPARATUS FOR REDUCING NOISE IN A BIDIRECTIONAL CABLE TRANSMISSION SYSTEM